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FORMERLY

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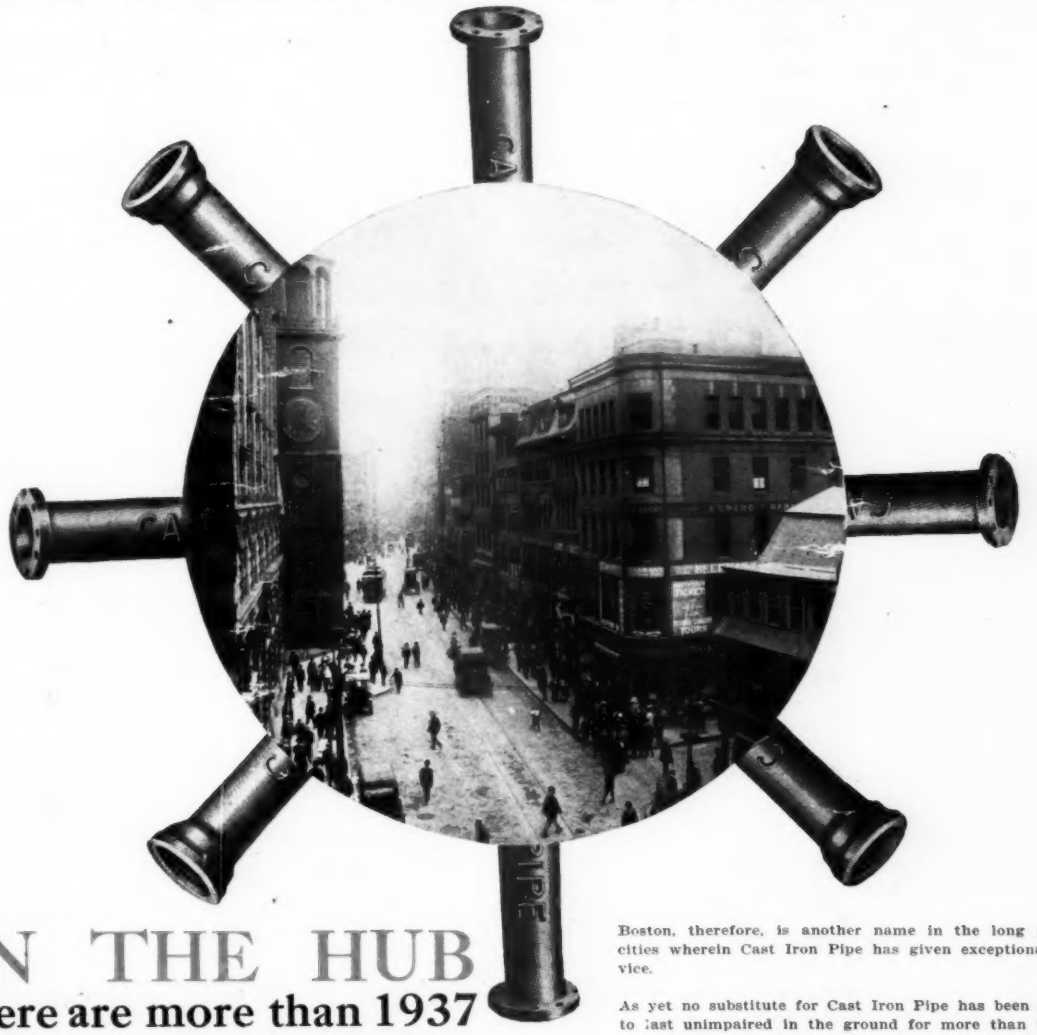

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The Cast Iron Pipe Publicity Bureau 1 Broadway New York

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KOPPERS

BY-PRODUCT
COKE AND GAS OVENS

The most efficient method of carbonizing coal is in KOPPERS OVENS and the best coke and by-products are produced by this process.

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AMERICAN
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Successful Operation of Optical Pyrometer Calibrating Furnace Proves that Gas Can Be Efficiently Applied to Temperatures up to 3000 Deg. Fahr.

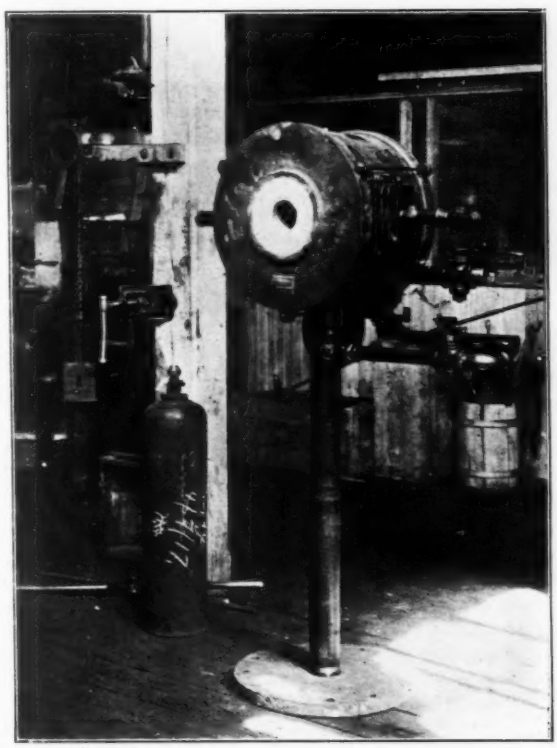
Development Opens a New and Promising Field for Industrial Gas Man—Furnace Built Entirely of Standard Shapes and Materials—Adaptability of Gas to Determination of Fusing Point of Coal Ash

By HENRY L. READ
Engineering Department, Surface Combustion Company, Long Island City, N. Y.

Until recently, electric furnaces have been almost universally used to calibrate optical pyrometers at high temperatures. City gas has not been employed for this purpose because of the practical impossibility of obtaining as much as 3,000 deg. Fahr. with the ordinary types of burners and furnaces using air and gas mixtures without troublesome preheating.

The principle of most optical pyrometers is to concentrate in some manner, a portion of the radiant heat from a furnace on a thermo-couple to which is connected in the usual way a millivoltmeter with suitable scale readings. The instrument is set up a convenient distance from the furnace and sighted on an opening through which an unobstructed view of the hot part is obtained. The needle of the meter soon moves to the correct position, whereupon the temperature is read directly. The accuracy, of course, depends on the care used in calibration which is often done by marking on the scale the positions the needle reaches at furnace temperatures established by the fusion of substances of known melting points. It has been found that for much of the work, a temperature of 3,000 deg. Fahr. is sufficient.

Surface combustion is peculiarly adapted to the production of high temperatures. In furnace, under discussion, the impact burner is used without the refractory bed. The necessary baffling of the mixture to reduce its velocity after it leaves the burner is obtained by friction against the circular walls as shown in the accompanying drawing. It will be seen that the mixture, entering the burners from the special Surface Combustion proportioning inspirator passes from the nozzles and scrubs along the sides of the furnace which



GASES AFTER WHIRLING AROUND CYLINDER LEAVE FURNACE THROUGH HOLE IN CENTER

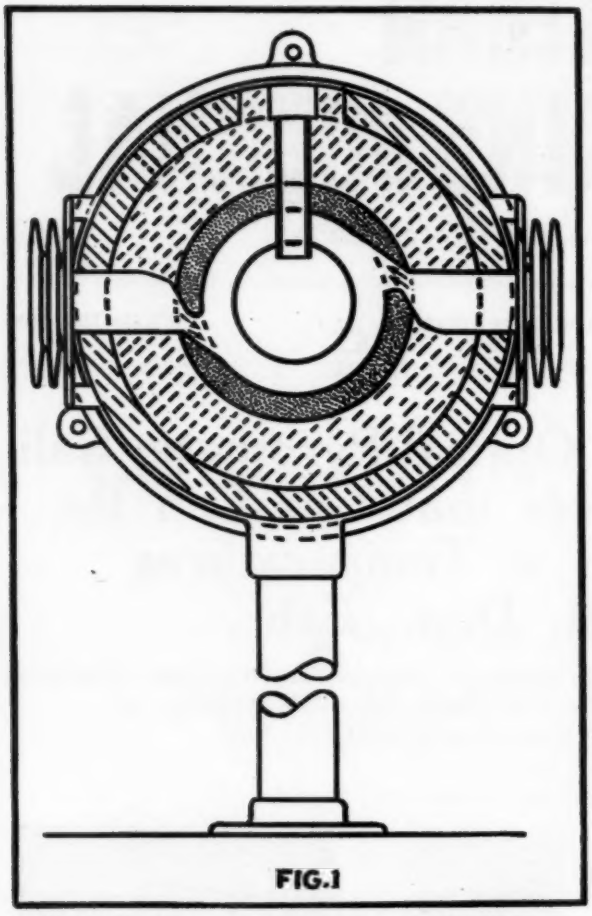


FIG.1

MIXTURE OF GAS AND AIR SCRUBS ALONG SIDES OF FURNACE

are protected by a layer of alundum cement. Ignition takes place on the inside of the cylinder and the gases, after whirling around, leave the furnace through the hole in the center of the front, shown in the accompanying photograph, which also serves as an opening through which the pyrometer to be checked is sighted.

In the middle of the back wall is a block of carborundum against which the pyrometer is aimed. Through an opening in the top an alundum tube is inserted with its open lower end a little above the axis of the cylinder. The purpose of this is to allow the end of a wire of some substance of known melting point, e. g. pure nickel, to be put in front of the carborundum block so that the temperature of the latter may be determined by the fusion of the wire.

Gas Consumption

The complete furnace was tested by the manufacturers and the purchaser with satisfactory results. A temperature of 3,000 deg. Fahr. was reached in one hour and twenty minutes with a total consumption of 420 cu. ft. of 650 B.t.u. gas. This point may be maintained on a gas rate of about 275 cu. ft. per hour.

It will be seen that a new and promising field has been thus opened for the industrial gas man. Chemical and physical laboratories are in constant need of high temperature furnaces with simple and accurate controls. The almost universally used electric furnaces of the resistance type are expensive to operate and are continually requiring troublesome and costly repairs that often are held up due to the necessity of obtaining special parts. The present furnace is built entirely out of standard shapes and materials.

Aside from the foregoing application, one that comes to mind is in the determination of the fusing point of coal ash. This is a test that of late has been gone into more thoroughly because of the serious clinkering of many coals when the fires are forced. Obviously of two coals of the same heat content, the more valuable is the one which clinkers the less. The higher the melting point of the ash, which is nearly always below 2,800 deg. Fahr. the less the formation of clinkers.

The common method of testing in an electric furnace has the objection, aside from the above-mentioned drawbacks, that the atmosphere in the furnace is entirely different from what it will be under operating conditions. This is often of considerable importance.

As gas has essentially the same products of combustion as coal, a furnace fired by gas would more nearly approximate an accurate test and would be preferable if it could do the work properly. Up to the present time the only objection to a gas furnace has been the impossibility of reaching the degree of heat necessary.

Another use of gas in laboratory work now made possible is in the ceramic industry where the high temperatures required have generally been reached by electricity or oil. An interesting Surface Combustion design for this work was able to hold a temperature of 932 deg. Fahr. and rise to a maximum of 2,732 deg. Fahr. This furnace was of the oven type with refractory beds and impact burners along the sides of the hearth.

Theoretical Flame Temperature

The important point to observe in high temperature work is that the theoretical flame temperature of the gas used with its correct proportion of air is sufficiently high to insure the furnace temperature required being attainable. With most city gases of 550 to 650 B.t.u. per cubic foot heat content, this theoretical flame temperature runs in the neighborhood of 3,500 deg. Fahr. according to the best information obtainable on specific heats. For methane, and consequently most natural gases, the theoretical temperature is slightly lower, but over 3,400 deg. Fahr. On these figures the assumption is made that the mixture enters the furnace at about 60 deg. Fahr. It is always necessary that there should be a fair margin of safety to allow for the furnace losses.

Rate Adjustment and Proper Application, Keys to Success in Industrial Field

To increase our gross revenues, we must look to industrial gas sales, and ways and means of increasing this desirable business, asserted R. A. Ziegler, division manager of the Central Indiana Gas Company at Anderson, in a paper presented at the recent annual convention of the Indiana Gas Association at Indianapolis. After careful consideration of this problem, in my opinion the two factors that enter most into the development of industrial gas sales are rate adjustment and proper application.

By establishing a sliding scale of rates for quantity sales, we can, with manufactured gas, secure and successfully retain industrial business along several lines of heat treating that now use producer gas, fuel oil and coke.

Gas Range Has No Real Competitor at Present, But Efficiency Should Be Improved to Safeguard Future Business

C. N. Chubb Contrasts Present Efficiencies With Those of Electric Range—Danger Attaching Too Much Importance to Cost Element

The gas range has no real competitor at present, declared C. N. Chubb, manager for the South Bend District of the Northern Indiana Gas & Electric Company, in his paper on "Gas versus Electricity" presented at the annual convention of the Indiana Gas Association, held recently at Indianapolis. We have little difficulty with gasoline, coal, or electric ranges.

We have attained this position only after fifteen or twenty years of concentrated effort in educating our consumers. We must not make the same mistake, that we did with the lighting. The electric range does not have to go through the educational period, for the public is ready to take up electric cooking just as soon as it can be convinced of the practicability of the electric range.

Past experience in lighting has taught the gas man that cost is not an all-important consideration. The electric range claims: Easy operation and control, heatless, odorless, and economical; easy of operation and control by means of automatic heat regulators and time limit devices; heatless and odorless due to good insulation; economical due to better efficiency. Easy control is certainly an advantage which should be adopted by the gas range.

Gas Range Little Better than Half as Efficient

The gas range is little better than half as sufficient as the electric range. Recent tests show that the top surface of the electric range requires but 64 per cent. of the energy necessary to do the same work on the top surface of the gas range. The electric range oven requires but 23 per cent. of the energy necessary for the same work in a gas range oven. The electric range oven is much more efficient in proportion than the top surface as compared with the oven and top surface of the gas range. Under actual household conditions the electric range requires about 55 per cent. of the energy used by the gas range to do the same work.

This point certainly should be given immediate attention by gas range manufacturers. By remedying this last mentioned defect we would attain less heat radiation and less odor.

The gas range, even under present conditions and prevailing gas and electric rates for cooking, has a decided advantage in cost of operation and speed. Speed is one big drawback in electric cooking.

The installation of electric ranges in any great number means a large additional investment by the electric company. It would mean large additional investments in copper for primary and secondary feeders, larger transformers, larger services, and a two-meter installation—one for light and one for heating. Further, this cooking load is a peak load and means additional investment in generating apparatus. The proper control of electric range heat means constant voltage delivered at heating units. The gas man knows what this means in main, service and meter investments from experience gained from large automatic water heater installations.

First Cost Difference

The first cost of the electric range is approximately double that of the gas range of equivalent capacity. The difference in cost is primarily due to the better construction of the electric range. With the advent of a better and more efficient gas range which will of necessity cost more to build, gas men will lose the present advantage of great difference in first cost.

Considering these things, the gas man may feel fairly secure about his cooking business, but we must not lose sight of the possible dangers in the future and prepare now to counteract every advance by our competitor.

Field for Gas Water Heaters Practically Unlimited

W. J. Barrett Indicates Possibilities that Lie in Displacing Tank Heaters by Automatic Types—Pilot Lighter Consumption in Latter a Factor of No Mean Importance

There are not many enterprising gas companies today that are not pushing the sale of gas water heaters. The field is unlimited. There is no reason why some type should not be installed in every home, asserted W. J. Barrett, superintendent of water heaters department, Citizens' Gas Company, Indianapolis, in a paper presented at the annual meeting of the Indiana Gas Association held recently in that city. Every home owner that at present has a circulating tank heater installed is a live prospect for an automatic gas water heater of some type. I am firmly convinced that as the tank heater supplanted the old water backs, so will the automatic heater supplant the tank heater.

The American public wants quick efficient service, and if you, by proper methods, will enlighten it as to how it may be secured, price will be a secondary consideration.

Pilot Lighter Consumption No Mean Factor

One point I would emphasize is the consumption of the pilot lighter on automatic heaters. In Indianapolis when we start an automatic heater the pilot is adjusted to consume only one cubic foot per hour. We found this a safe adjustment. Using this as a basis with approximately 2,500 automatic heaters in Indianapolis the consumption of the pilot lights alone would be 60,000 cu. ft. each twenty-four hours, or 1,800,000 cu. ft. per month. I believe any gas burning appliance that assures us of even a small consumption each hour of the twenty-four is a valuable thing for a gas company to make popular.

As to the methods you should use to promote the sales of automatic gas water heaters the proper sort of advertising and good salesmanship combined is necessary. If your commercial department be divided into sub-departments by all means have a water heater department and with the proper attention it will repay you. Co-operate with the manufacturers in every way and get the benefit of their advertising. A few of the larger manufacturers have separate departments. They will be pleased to study your local conditions and assist you in the sale of heaters. Some of the schemes these manufacturers are using to advance the sale of gas water heaters are: advertising in widely known magazines, such as the Saturday Evening Post, Ladies Home Journal, and other well known house organs. You will also find their advertising in the Plumbers Trade

Journals and in "Sweets" a magazine found in the office of every up-to-date architect. Locally they furnish demonstrators and experienced water heater experts who will instruct your salesmen and give them advice as to the proper methods of installation. They furnish sheets for bill-boards, attractive slides for motion picture shows, and if given a list of your water heater prospects, they will circularize them for you. I assure those of you who are not taking advantage of this service offered by the manufacturers that you are overlooking a "good thing."

The Large Part the Plumber Plays

There is one other party whose co-operation should be solicited. I refer to your local plumber. Do not overlook him. If it is possible to gain the good will of the plumbers by all means do it. How many times have your salesmen reported they had the heater about sold when the plumber knocked it and you lost the order? The Citizens' Gas Company in 1916 sold to our local plumbers $8,000 worth of automatic heaters. It has always been the policy of this company to co-operate with them and we find it pays, not only in the sale of water heaters but in other gas burning appliances such as gas steam boilers, gas steam and hot water radiators, garbage destroyers, gas grates, and many other appliances which they have occasion to recommend. In many homes and business buildings you will not find a foot of gas pipe above the first floor and you may thank some plumber who is not co-operating with the gas company for this condition.

Your architects should be called on at regular intervals. They should be kept acquainted with improvements made on heaters. They also should be notified of any change in list price of the different type heaters. They should be made to feel that when they have a job requiring the use of an automatic heater they are at liberty to call the water heater department of the gas company and get proper information as to the size and type they should specify.

Installation of Proper Sizes

In my opinion the most important part of the sale of an automatic gas water heater is the proper recommendation as to the size and type best suited for the particular needs. For instance it would be absurd for a salesman representing the gas company to waste the company's time trying to sell a 2 or 2 1-2 gal. per minute automatic instantaneous gas water heater to furnish domestic hot water supplying a four-apartment flat building. Such a heater is not of sufficient size, and tenants of building would complain of unsatisfactory service.

Neither should a No. 6 automatic instantaneous gas water heater be installed in a bungalow home where only three or four hot water faucets are used. In this case the gas bills would be excessive for the amount of service rendered.

You may say these are extreme cases but I have inspected just such jobs and you will find it very hard to sell automatic heaters in a neighborhood where such an installation of this kind has been made. Therefore, extreme care should be taken to inspect the prospective buyer's premises before recommending the size and type heater he should install.

Consumer Takes No Risk In Purchasing

Each automatic gas water heater sold by the Citizens' Gas Company is installed complete on thirty days' trial —no money down. We do not ask the customer to depend on the guarantee of the manufacturer as to workmanship and material, but to install it with the understanding that if it is not entirely satisfactory at the end of the trial period we will remove the heater, or if it has been purchased by the customer through his plumber we will also refund the plumber's bill for installation. We have followed this plan for six years and up to the present time have been obliged to remove only one heater.

Before recommending the size and type heater to your prospect I would advise that you secure the following information:

Number of hot water faucets on premises.
Number of them that would be in use at one time.
If city water or soft water is to be used.
If city water is used, you undoubtedly know the pressure carried in the main.
If soft water is to be used, acquaint yourself as to whether a compression tank is to be used.
If compression tank is to be used and motor is of sufficient size and in good condition, there should be practically the same pressure as that of the city water.
If open tank is in use ascertain the pressure at highest faucet.

The hand books published by the water heater manufacturer will give you data as to the number of gallons of water per minute a given size automatic instantaneous heater will pass under a given pressure. This information is valuable when figuring a gravity job, especially if it is your intention to install an automatic heater. I, personally do not recommend the direct automatic heater on gravity jobs. I believe this to be the proper place to recommend an automatic storage combination.

Proper Size of Gas Service

By estimating the number of cubic feet of gas per hour consumed by the present gas burning appliances on premises and adding to that the number of cubic feet that would be consumed per hour by the heater recommended, you can then determine if the gas service entering the building is of sufficient size. You should locate a flue for heater, and I find too much care cannot be taken in securing the proper flue connection.

After securing the above information, recommend to your prospective buyer the automatic heater best suited for his needs. After sale has been completed and installation made it is necessary that the salesmen should follow the sale up and see that the heater has been connected in a workmanlike manner and adjusted properly. If installation has been made in a residence see that as many members of the household as possible are made acquainted with the heater. Go to the different hot water faucets with them and show how long they may expect to wait before water will become hot, then explain why they cannot get hot water at the "Turn of the Faucet" and "Quick as a Wink" as some of the manufacturers' catalogs so artfully state. Be sure and explain the condensation on coils of heater which will save you a trip back on a leak complaint. We find that after following out the above suggestions the heater "stays" and makes friends with all the members of the family.

I fully understand that the type heater you may recommend to your customer depends a great deal on your local conditions. If troubled with extreme low water pressure automatic instantaneous heaters would

give trouble, but the automatic storage combination would take care of such conditions. These systems may be secured in several sizes to suit requirements. They are naturally more expensive to operate than the automatic heater, and will decrease in efficiency much sooner.

In territories where the water is extremely hard lime will deposit in the coils and is the cause of much maintenance expense and also inconvenience to the user. During the past three or four years the water heater manufacturers have tried to avoid this complaint of lime by building a special tank. These tanks are built with an outer jacket, the heater being connected to the outer part only. The water circulates around the tank and heats the water in the inner compartment by radiation of the hot water in the outer shell. As there is no water drawn from the outer compartment and this is the only water which comes in contact with the coils of heater, in theory, it should not lime.

Up to the present time we have not been able to get sufficient data as to the difference in cost of operation between the hard and soft water system, and it remains a question as to whether the cost of replacing coils due to lime, and the inconvenience to the user, is great enough on the straight storage system to make it advisable to recommend the hard water system with its greater gas consumption, even though it has better service efficiency. I believe the water heater manufacturers should get some reliable comparative data as regards these two systems.

Heating Water In the Apartment Buildings

In Indianapolis we recommend the automatic instantaneous heaters where it is at all practical to use them. We have had considerable success heating the domestic hot water in flat buildings. Up to four apartments we use the automatic instantaneous heaters. In all cases where possible this heater is installed supplementary to the boiler connected to the heating plant for winter use. Where such installation can be made in four-apartment flat buildings we recommend a No. 6 size and are securing good results. The average gas bill through the year for such installations in Indianapolis is $3 per month.

Bungalow and Cottage Heaters

We are making many installations in the modern doubles and duplexes using the bungalow or cottage type heaters in such places, the owner of building supplying the heaters, gas being supplied through tenants' meter. Outside of heating water for domestic use I find that restaurants, barber shops, hair dressing parlors, and soda fountains are good prospects for these heaters. Many industrial plants too are furnishing hot water for the use of their employees.

While I have dwelt mostly on the automatic water heaters we should not forget the tank heater as it will be some years before they will be replaced by automatics, and until that time we should sell and recommend only the most efficient type. I am a firm believer in copper coils as a heating medium. While their initial efficiency may not be much greater than the iron disc heater you will find the service efficiency much greater. One type of gas water heater I do not approve of is the instantaneous water heater that is installed in the bath room. I do not believe the bath room the proper place to install a water heater. While I realize many of these are manufactured and sold, I contend they are a detriment to the gas company's interests.

Accuracy in Advertising

Just one other matter I would call to your attention with all due respect to the advertising departments of the water heater companies. I have yet to see hot water at the "Turn of the Faucet," "Hot Water Instantly," and "Hot Water Quick as a Wink." All of these phrases you will find in their catalogs trying to convey the idea of quick service, but their expressions fall somewhat short of the truth. Often when I have been explaining to a prospect the length of time he could expect to wait after turning the faucet before water would become hot he would say "Your catalog gave me the impression I would get hot water instantly."

With all due respect therefore to our friends, the manufacturers, I would suggest that they refrain from exaggeration and issue literature which contains complete information regarding the construction and operation of their heaters. This may be done in a very effective way and yet no claim made which cannot be seconded by the gas company whose guarantee must go with every heater sold.

Isolated Road Houses Prove Attractive Field for Gas

W. H. Crawford Indicates Certain Kinds of Business Requiring Extensions to Secure, Which Prove Profitable Customers—Temporary Industrial Business Worth Going After

A great many people look upon the business which requires an investment in main to secure it, as not of the attractive kind. Certainly business which does not require this investment is more desirable, but a good percentage of this business when thoroughly investigated can be secured and will return a very satisfactory profit on the investment, declared W. H. Crawford, sales manager for the Northern Indiana Gas & Electric Company at Hammond, Ind., in a paper presented at the recent annual convention of the Indiana Gas Association, at Indianapolis.

Located in a certain section of the territory supplied by our company are eleven so-called road houses, which supply fish and chicken dinners. They depend mostly on the automobile travelers for their business on account of their isolated location.

An investigation made by our special industrial salesman, showed a record of the total number of meals served in a month, the number of gallons of gasoline consumed in cooking, and an estimate of their gas consumption.

These figures surprised us and it was decided to try and secure at least a portion of the business.

The proprietor of the first road house was interviewed and after the advantages of the gas were explained to him, guaranteed to use gas to the amount of $300 during the first year. This guarantee was agreed to by five of the other proprietors, and after the initial canvass, orders were taken and the following appliances were installed:

70 No. 52 Vulcan Special Hot Plates.
37 Inverted Gas Arcs.
5 Inverted Gas Lamps.
6 Domestic Gas Ranges.
3 No. 2 Eclipse Special Ranges.
1 Two Section Stewart Hotel Range.
5 Coffee Urns.
1 Steam Table.
1 Stewart Boiler.

1 Circulating Water Heater.
3 Automatic Storage Water Heaters.
8 Fifteen Section, Two Col. Clow Gasteam Radiators.

Service to these buildings was furnished about May 1, and according to our records the total consumption for the months of May, June, July and August amounted to 1,789,000 cu. ft.

The above instance is cited as an example to show there are extensions which apparently are unattractive but when properly investigated prove highly profitable.

Industrial Business

The unprecedented price and lack of supply of fuel oil, together with the inferior quality of oil that is obtainable, has opened up a market for gas in quantities heretofore not given consideration. Gas today is the logical fuel for a great many heat treatments, where it was formerly out of the question on account of the cost.

The market is naturally in factories and industries, which in most instances are located in the outskirts of the cities, and requiring a considerable investment in main extensions to reach them.

This class of business with some gas companies is placed in the hazardous class, fearing a material reduction in the price of oil or a sudden cessation of industrial activities on account of the discontinuance of the war.

Nevertheless it is quite possible to acquire considerable of this business which is safe as far as the company is concerned, and equitable to the consumer. There is lots of it that will remain on gas companies' lines after the war is over and the price of oil has gone down to normal.

After a manufacturer becomes familiar with the advantages of gas and gets accustomed to its uses, it will be a difficult matter to convince him that it is advisable to return to the other fuel.

Main Extension Records

The matter of keeping an up-to-date record of all main extensions is of vital importance, not only for the information it gives, but also for the promotion of the sale of gas.

We have always endeavored to co-operate and have harmonious relations with our architects as we believe it is of mutual benefit. It should be one of the first duties of the architect to find out if service will be available, before even starting the design of a house. In justice to his client he should have this information, as it would not be creditable for him to recommend and have installed either gas or electric fixtures, and after the investment was made to find out this service could not be had without a great expense. In the event of its requiring an extension the matter can be taken up with the owner and settled long before the service is needed.

It is the duty of our special salesmen to call at the city clerk's office every week and take a record of all building permits issued during the week, then call upon the architect and owner. There are two main points to be accomplished, first to see service conditions and second to arrange with the architect to provide for heating the kitchen from the furnace and eliminate the coal range. Anyone building a home, which is to have furnace heat, would provide the necessary heating facilities for the kitchen if it were suggested to them, and this arrangement is highly desirable as it insures the gas company of 12 months consumption for cooking in place of seven or eight months, the other three or four months the cooking being done on the coal stove. He endeavors to make necessary arrangements in the kitchen to accommodate the cabinet style of range.

The information acquired in this manner is surely valuable to a sales organization as it furnishes many prospects and gives the salesman an opportunity to interview the owner before he has definitely decided upon the appliances he will use.

According to the records on file in the office of city clerks the dwellings erected in our territory during 1916 were as follows:

Hammond.	East Chicago.	Whiting.	West Hammond.	Total.
407	406	60	63	936

Gas service was furnished to 923 of these houses, seven of the remaining 13 houses refused to have the service installed and the other six were located great distances from our mains.

We occasionally have an application for service, from a section which does not show any indications of future development, and the estimated revenue does not warrant the necessary investment. In any such case we consider it inadvisable to refuse to render this service, but prefer to offer the applicant some proposition whereby they can get the service.

The most popular arrangement for a condition of this kind is where the applicant deposits with the company an amount over that which is warranted by the revenue and this amount is refunded pro-rata for each additional consumer taking service from the extension. In this connection, I believe the company should at all times give due consideration to the future development of the section from which the application comes, and make careful inquiries of any proposed plans that are anticipated.

New Subdivisions

An investment to supply a new subdivision which is located in the outlying districts and where the street and sewer improvements are not in, is to the writer's mind most hazardous, and should be investigated most carefully before any kind of negotiations are entered into. The promoters are permeated with confidence in the future possibilities, otherwise they would not have invested their money. They are very flattering in their estimates of the growth that will take place and are as a rule antagonistic to any one who is not of the same opinion as themselves.

The first investigation into a proposition of this kind should be the financial responsibility of the promoters. The opinion of other men familiar with the real estate situation should be solicited. The development of contiguous territory should be considered, and the comparative price at which the ground is to be put on the market.

It is not unusual to find the promoters requesting the gas mains be installed after the ground is graded and long before the streets are improved, and in this event the investment will be made and remains idle for a considerable period. They, of course, wish to advertise that all improvements are immediately accessible. The gas company is expected to spend its money to help promote the sale of the lots.

The safest way to handle this character of business is for the promoter to deposit with the gas company (in advance or a satisfactory guarantee to pay when completed) the entire cost of the mains, and this amount

to be refunded pro-rata for each consumer taking service.

Extensions in Undedicated Streets

In the outlying districts of some cities where the streets are not dedicated, there is quite a field for the sale of gas. These streets are not recorded as streets by the city, and for this reason they may not be opened for the laying of gas pipe on a permit issued by the city, since they belong to the property owners and do not come under the supervision of the city. Therefore, if the company desires to lay its pipe, it must first secure a permit from each of the abutting property owners, or their agent.

The above is true of furnishing service to residents in courts or alley ways, and in one district of a large city with which I am familiar the gas sales amount to approximately 20,000,000 cu. ft. per year to this class of consumer.

The development of a public utility is dependent on the growth of the community which it serves, and its additional revenue, to a considerable degree upon the extension of the service.

While the investment is always increasing and it is desirable to maintain a proper ratio to income, still it is necessary to place some faith in the future, as otherwise a limitation is set upon your business which curtails its progress.

By-Product Ovens in Operation by 1918 will Save Fuel Equivalent of 9,000,000 Tons of Coal Annually

C. J. Ramsburg and F. W. Sperr, Jr., Furnish Interesting Comparisons—Effect of Saving Will Not Only Be Felt by Posterity but Earlier, as It Is Taking Place in Low Ash, Low Sulphur, High-Grade Coking Coal

While one is much impressed by the amount of money saved from the recovery of the by-products of the distillation of coal in by-product ovens and by the stimulus given to the chemical and manufacturing industries by the supply of such an abundance of raw materials, the most impressive fact is the conservation of our coal supply brought about by the introduction of modern methods, declare C. J. Ramsburg and F. W. Sperr, Jr., vice-president and chief chemist, respectively, of the H. Koppers Company, in a paper in the April *Journal* of the Franklin Institute. It may be of interest to put aside, for the moment, the question of profits obtainable from the sale of ammonium sulphate and other by-products as materials of chemical industry, and to make a few calculations simply from the standpoint of fuel values. To put the matter on the most conservative basis possible, let us figure such values in terms of coal.

The accompanying table shows the fundamentals of the matter from this standpoint.

This table shows a total fuel saving of 825 lb. of coal per ton of furnace coke. The fuel value of the gas is put not at its value compared with the coal necessary to replace it with producer gas, which is necessarily made at a low efficiency, but as against raw coal: B.t.u. for B.t.u.

There is a further saving in the blast furnace. Reports from a large number of blast furnace plants indicate that a saving of 200 lb. of coke per ton of beehive coke formerly used is a conservative average figure.

Figured back on a coal basis, these 200 lb. of coke represent 282½ lb. of coal at the beehive oven, so that the total saving amounts to approximately 1,100 lb. of coal (0.55 ton) for each ton of by-product coke made in the modern plant.

Since the ovens gained in operation from Jan. 1, 1915, to 1918 will produce practically 16,200,000 tons of coke per annum, it follows that these ovens will save annually to this country fuel equivalent to 9,000,000 tons of coal.

While it is true that the total coal resources of America have up to this time hardly been scratched, nevertheless it is important to emphasize that this saving is taking place in low ash, low sulphur, high-grade coking coal—coal which, from its mining locations, naturally carries the most favorable freight and labor conditions, and as such is of vast importance—to us and to posterity.

By-product Yields from Coal Such as Now Used to Make First-class By-Product Coke in the Middle States District. 85 Per Cent. High Volatile, 15 Per Cent Low Volatile.

		Fuel Value equivalent pounds of coal.
To make 1 Ton Furnace Coke. 1.4 to 1.5 Tons Coal Required. By beehive coking, the by-products wasted have a heat value equivalent to 625 lb. of coal. At least 200 additional pounds of coal are wasted in the process of beehive coking by combustion.	Surplus Gas. 9,000 cu. ft., 550 B.t.u. Used as fuel.	350
	Tar. 12 gallons. Used to make creosote oil, pitch, lampblack, various oils and dye materials.	133
	Ammonium Sulphate. 33 lb. (or, in form of 25 per cent. ammonia liquor, 33 lb.). Used for fertilizer, for refrigeration, and for nitric acid and other chemical manufactures.	(No fuel equivalent)
	Benzols (as light oil). 4.5 gallons. Used for motor fuel, dye material base, phenol and other chemical manufacture, solvent and cleanser.	42
	Coke Breeze. 120 lb. Used as fuel.	100
	Total	625
	Add coal equivalent wasted in beehive oven	200
	Total economy of by-product oven per ton coke	825

Pipe so Corroded that Light Hammer Blow Drives Hole Through It Carries Pressure Without Apparent Leak

Where current leaves a wrought-iron or steel pipe for earth the oxide of iron resulting from electrolysis becomes diffused through the earth and streaks of iron oxide can generally be found in the surrounding soil. Electrolysis of wrought-iron or steel pipes usually results in pits, which eventually go entirely through the wall of the pipe, stated Albert F. Ganz, professor of electrical engineering at Stevens Institute of Technology, in a paper presented recently before the New England Water Works Association.

It has frequently been found in practice that where a gas service pipe lies in clay or other tightly packed soil it may be pitted through in many places without giving any external sign of leakage because the soil surrounding the pipe maintains it gas-tight.

When cast iron is corroded by electrolysis, the oxides of iron mixed with graphite usually remain in place, leaving the outside appearance of the pipe unchanged. This material resulting from the electrolysis of cast iron usually has the consistency of hard graphite, and can be cut with a pocket knife.

There have been many cases in which a cast-iron main was carrying gas or water without any apparent leak where a light blow with a hammer drove a hole right through the pipe. Here the electrolytic action had corroded the iron entirely through the pipe, and the oxide of iron had remained in place and, together with the surrounding soil, had prevented the pipe from leaking.

Whether or not the mixture of iron oxide and graphite resulting from electrolysis remains in place so as to maintain a pipe gas or water-tight depends upon the surrounding soil conditions.

An Unusual Installation

William A. Richardson, commercial manager of the New Orleans Gas Light Company, has worked out many plans for utilizing the Humphrey 5-1 tank heater. The above photograph is one of the many out-of-the-ordinary installations that have been made under his supervision, and was described in the March issue of *Energy*, which is published by the New Orleans Gas Light Company.

The John Van heating table, shown in the picture, which is being used in the restaurant of Mr. Flettrich, in the Poydras Market, was formerly supplied with three gas burners placed at intervals under the table, which kept the water hot in the pockets of the table, so that when the large earthen receptacles which contained the food were set down in these pockets they were kept hot at all times.

Mr. Flettrich has an all-gas kitchen in his restaurant, which is inspected every now and then by Mr. Richardson or one of his representatives. In looking the kitchen over some time ago Mr. Richardson decided that the efficient 5-1 Humphrey tank heater would not only be a more economical way of keeping the food warm by continually circulating the water, but would be a much more convenient way.

Realizing the satisfaction and economy which has resulted from the use of the different gas appliances Mr. Flettrich is using, he did not hesitate to have the change made, and now says that the advantage and economy derived from the new system could not be exaggerated.

HEATING TABLE INSTALLED IN POYDRAS MARKET

Mr. Richardson has many out-of-the-ordinary installations with different gas appliances in the city. He says: "Necessity is the mother of invention." If a manufacturer does not make an appliance to cover some particular need he will have it altered to meet the demand which he requires of it.

Being a practical man and having spent a large number of years in the gas business, Mr. Richardson has given suggestions for greater efficiency and durability to manufacturers of gas appliances, and these suggestions have not taken anything from the appliances, but have made it possible to "*Do it with Gas.*"

Employees' Garden Movement Gathering Momentum

The employees' garden movement is gathering momentum every year, and clubs are springing up all over the country. The average manufacturer of to-day recognizes in them one of the greatest efficiency builders and satisfaction producers yet discovered.—*W. F. French, in The Nations Business.*

Industrial Rates in Natural Gas Field Wasteful

The natural gas companies have in the past and a great number are now selling their product with its high heating value far below its true worth, the selling price often being 10 cents per thousand or lower, declared R. A. Ziegler, division manager of the Central Indiana Gas Company at Anderson, in a paper presented at the recent annual convention of the Indiana Gas Association at Indianapolis.

This is an economic error which has encouraged a most wasteful use of this valuable fuel, thereby making the services of trained industrial engineers useless. This practice must sooner or later be abolished and the natural gas production conserved and used for the more refined industrial purposes which should bring to the distributors a price of not less than treble the present average price. The entire natural gas production can be marketed at such prices when right principles of application are applied.

Offers Suggestions for Extending Industrial Gas Business

R. A. Ziegler Discusses Such Factors as Engineering, Co-operation with Manufacturers, Advertising, Service, Prospects, Installation and Application

R. A. Ziegler, division manager of the Central Indiana Gas Company at Anderson, in his paper on "Industrial Gas," presented at the recent annual convention of the Indiana Gas Association, brought out a number of new angles in regard to the industrial fuel gas field. The following extracts have been taken from his paper.

Industrial Gas Engineer

We should profit by the success of others and create a fund for experimental work, and wherever the prospects justify, a competent industrial gas engineer should be employed and given full charge of all industrial sales and be responsible for the proper construction, care and operation of all installations.

The compensation paid should be sufficient to guarantee the best help obtainable. Small companies, or where the business does not justify the employment of an industrial engineer, a careful survey of all prospects should be made, the results of these findings submitted to a competent engineer and receive expert opinion on what could be successfully handled on gas and the proper installations for same.

An industrial gas engineer salesman should have a technical education with constructive imagination that would enable him to step into a factory or industry and analyze economic and labor conditions and work out economies in present systems of manufacture where heat is used, by the substitution of gas.

His suggestions must be practical and original in order to command the respect of the factory superintendent, foreman and workmen. He must have the co-operation and confidence of the manager and all the employees of the gas company in order to command the esteem from his customers. An industrial gas salesman's position is a hard place to fill and deserves a high-class man. A good man will pay dividends and a poor one spells failure.

Co-operation with Appliance Manufacturers Necessary

Often in over-anxiety to secure industrial business, the salesman is liable to install gas in existing furnaces or appliances without proper investigation, and the experiment often results in failure.

In a great many cases, the present equipment can be made to work satisfactorily by installing gas burners, and whenever this can be done, it is good policy not to burden the consumer with expensive equipment, but before burners are installed, a thorough survey should be made of work to be accomplished—drawings made and every detail of the operation set out, such as quantity of material handled, the time required, temperature, how handled, speed required, and any other information that can be obtained, together with the desired results expected clearly stated, and this data sent to reliable appliance manufacturers in order that their opinion can be had. This policy would put information in the hands of manufacturers that would be invaluable, and enable them to produce appliances that would better meet our needs.

The appliance manufacturer and the gas company's interests are mutual. Why not get better acquainted and co-operate with each other more? It will result in increased business for both and added efficiency for the consumer.

All manufacturers of industrial appliances send out complete catalogs and support their catalogs from time to time with bulletins, and if we will read and study these catalogs and bulletins carefully, we can gain valuable information. In fact, they can be made the means of an education along industrial lines.

If, at any time, you develop new ideas or have been able to secure business that heretofore you were enable to handle, communicate such information to appliance manufacturers and gas journals—they will be glad to have them included in their bulletins, and published in the trade journals for the benefit of the fraternity in general.

The inter-changing of ideas and close co-operation with industrial appliance manufacturers will do more to increase the industrial business, that is so valuable for our future success, than any other one thing we can do.

Advertising

While I am a firm believer in newspaper advertising and am of the opinion that we as a fraternity do not use enough newspaper space, yet for industrial gas sales I would advise other forms of advertising for the reason that industrial consumers are comparatively few in number, therefore newspaper space should be used for general publicity.

Pamphlets or circulars are good mediums, but care should be exercised to send only literature that the prospect is interested in. One of the best advertisements for all gas companies is a good-sized book, at least 8 in. by 11 in., containing actual photographs of installations made in your own territory, when possible, with full data showing results of actual operating conditions, such as speed required, advantages gained and cost of installations. Being equipped with data of this kind, you will always be able to interest a prospect, for he wants to know what has been accomplished.

Service

After a careful study of all prospects, you will find that the modern business man wants not only merchandise in the form of solid, liquid or gaseous fuels, but he wants that which will give him the best results, and he will not be slow in recognizing the superiority of gas when its advantages are clearly pointed out.

He is not interested so much in the price of the gas you are selling as in the comparative result for the dollar he pays over your counter. The superiority of gas over other fuels, such as dependability, cleanliness, instant control, even temperature and countless other advantages peculiar to the work it is put to, together with the added advantage that the consumer is not burdened with the purchasing, delivery and storage of other fuels, will appeal to the prospect when put to him in the right light. Again, the service rendered by the gas engineer will prove an advantage to the consumer and this service will secure for you all the business you are entitled to.

Industrial gas service begins when your salesman en-

ters the manufacturing plant and ends after all available business has been connected and is continuously performing its duty satisfactorily.

Industrial Prospects

Before starting on a campaign for industrial gas business, a careful survey should be made and a list of every use of fuel (coal, coke, charcoal, oil and gas) compiled, and an effort to secure first that class of business which is easiest to get and to hold, and so on down the line until the full result of the survey has been determined. You seldom hear of a gas company that has not offered special inducements from time to time to the domestic consumer, such as free service, free gas from one to three months, $5 or more for any old coal, wood, coal oil or gasoline stove allowed on the purchase price of a gas range, which business would net from $18 to $36 per year revenue, and at the same time refuse to install an installation free or on a trial basis, that would not cost more than $5 or $10 for an industrial consumer that would net more gas sales in one month than the gas range would in a year.

Deferred earnings that you do not get on a policy of this kind would more than pay for any liberal installation policy that would be required to get the business. Spend the same money on industrial business that you now spend for securing domestic business and the increased sales will be highly gratifying.

Among some of the industrial prospects, the following belong to the gas industry on account of the superiority of the fuel and more refined application:

Lead, cyanide, and case-hardening furnaces.
Caldron furnaces.
Tank furnaces.
Soda kettles.
Confectioners' furnaces.
China kilns.
Oven furnaces.
Water stills.
Annealing furnaces.
Rivet heaters.
Lacquer and japanning ovens.
Lehrs for glassware.
Tire expanding furnaces.
Steam boilers for bakeries.
Babbit bronze, aluminum and brass melting, etc.

There are many uses for industrial gas that will be developed by a carefully prepared survey of the prospective business in each locality.

Installation

A great deal of the success of industrial gas sales is due to proper installation. Care should be exercised in the size and capacity of service lines, meters and piping from meter to appliances. Often gas or an appliance has been condemned only because the service was too small or the meter capacity inadequate. Never permit a trial installation until these conditions have been made right.

An appliance should not be sold and installed for a consumer unless it is the proper thing for him to use. We must remember that the appliance is only a means to an end, and we should not let the thought that we have certain appliances in our stock warp our better judgment and make installation unless we know they will be successful, for failure destroys the customer's confidence in our ability to compete with other fuels.

Do not fail to consult with the superintendent, shop foreman and prospective operator of your fuel application as to what is, in their opinions, the best installation. It will not hurt to have your views differed with and you will often pick up valuable information, always remembering that the success of your installation in a very large degree is in the hands of the operator to work out.

A very important factor where even temperatures are required is a constant uniform pressure with a thermostatic control equipment often requiring special governors and thermostats. When such conditions arise, you should consult the manufacturer of these equipments, giving them drawings and full details in order that they can fill your orders intelligently. By specifying full details when order is given, delays are avoided that might cause serious losses.

Success of Industrial Business Due to Application

A few years ago, the only industrial gas business thought obtainable was for small work in standard size furnaces, but in recent years, gas has been used more generally. This increased use of gas is not due entirely to the unstaple condition of the fuel oil market, and the general tendency of the gas company to adopt a sliding scale of rates, but rather to the improved application of gas.

Furnaces are being constructed in a manner to radiate or reflect heat temperature far greater than what is known as the flame temperature, and it can safely be said that 25 per cent. of the success of industrial installations is due to the gas and its advantages, and 75 per cent. to its application.

Improvements have recently been made in burners that enable us to attain more nearly perfect combustion, thereby enabling us to burn more gas in a given space. The above improvements have enabled the gas fraternity to secure business that heretofore was thought impossible.

Gas furnaces of standard sizes for such operations as lead cyanide and case-hardening have long been in use in small installations, but recently some very large installations have been made that show to what extent gas is making inroads in the industrial field.

Seemingly Simple Industrial Problem Takes Ten Days to Solve, But Results in Compensating Revenue

H. H. Dunn, industrial engineer of the Roanoke (Va.) Gas Light Company, recently undertook the devising of gas equipment to melt butter on turn-over buttered rolls without making them crusty. He started off with confidence as the task seemed simple, but found the problem more difficult to solve than it seemed. After ten days of effort he solved it by installing one-hole hot plate on which was placed a small single Elgin oven in which the rolls are placed to melt the butter properly. On top of this oven he placed a number 20 Ideal Steam Cooker with wire shelves. With a small amount of water in the pan, the heat from the oven in which the rolls are placed to melt the butter just gives the proper amount of moisture by being placed on top of the Elgin oven and keeps the rolls from becoming cold or soggy. This installation, with two small coffee urns is now bringing a revenue of $12 per month.

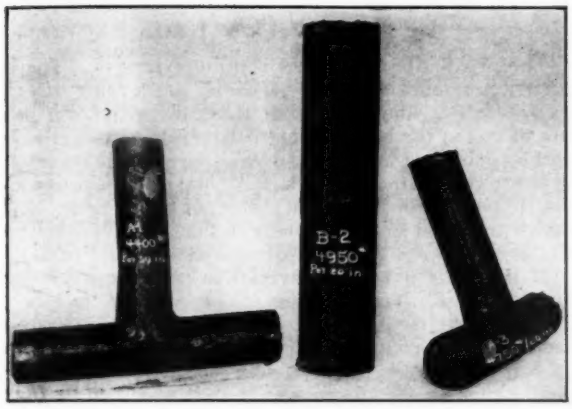


FIG. 1. SHOWING SPLITTING ALONG LONGITUDINAL SECTION

Strength of Welded Steel Pipe Connections Much Greater Than Malleable Iron Screwed Fittings

Prof. F. H. Sibley Gives Results Obtained in Second Series of Tests Which Bear Out Conclusions Reached in Tests Made a Year Ago

In a second set of tests of welded and screwed pipe connections made recently, supplementary to a series made last year, F. H. Sibley, professor of mechanical engineering at the University of Kansas, obtained results that bear out the conclusions given in the previous tests, namely: The strength of a welded pipe connection is practically the same as that of unwelded pipe. By slightly building the weld it can be made stronger than the rest of the pipe. The strength of the welded pipe connection is very much greater than that of the malleable iron screwed fittings. Although a careless or inexperienced operator might produce a leaky joint, if the line is tested for leaks when installed, it should give no difficulty in service.

The tests were conducted in the machine construction laboratory of the University of Kansas and had for their purpose the determination of the relative strength of welded and screwed connections in steel pipe of various sizes when subjected to internal hydraulic pressure.

The pipe samples, which were cut from standard black steel pipe, were from the same stock and hence probably of uniform quality. The welded specimens were made by operators of the Oxweld Acetylene Company, Chicago. The screwed connections were made up with malleable iron couplings and tees by expert pipe fitters. The pieces for the butt welds were cut at an angle of about 60 deg. in a pipe cutting machine to get the necessary "V" groove for welding. The "T" welds were made by cutting a hole in the run and butting the outlet against the run. The ends of all the specimens were sealed by welding in plugs or discs made from boiler plate punchings.

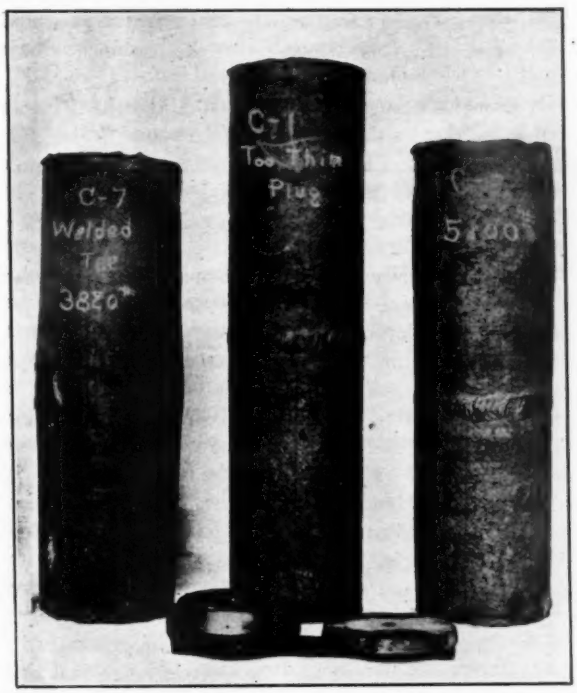


FIG. 2. BULGED UNDER HIGH PRESSURE BUT WELD AND SEAM HELD

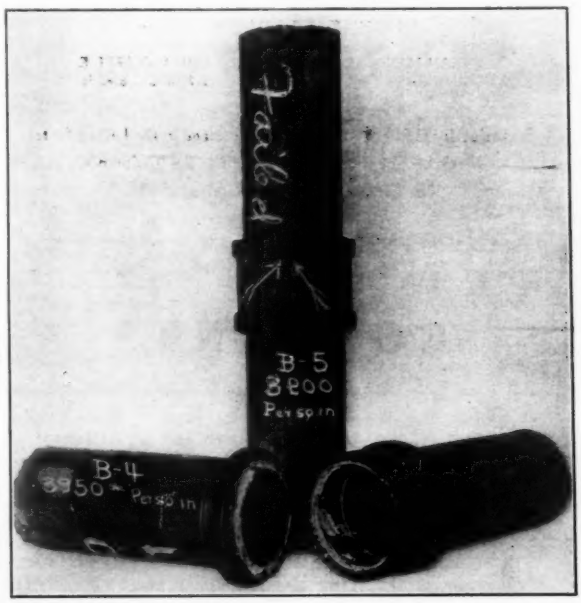


FIG. 3. HOW THE SCREWED CONNECTIONS FAILED IN TESTS

The specimens were subjected to pressure by means of a small hydraulic pressure pump, which was made especially for this work. The specimen under test was placed about 25 ft. from the pump and connected to it by means of a ½-in. copper tube. A pressure gage with a check valve opening toward the gage was placed between the pump and the specimen. The check valve was necessary to steady the pressure in order that satisfactory readings could be obtained because some of the samples carried pressures greater than 5,000 lb. per sq. in. before failing.

The illustrations show several of the specimens tested and their modes of failure.

Welded 2 and 3 in. specimens are shown in Fig. 1. These failed by splitting along the longitudinal seams of the pipe, the split stopping at the welded section.

(*Continued on page 422*)

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In Next Week's Issue

The prohibition movement is quite extensive. There are many territories where breweries are a thing of the past. Unless yours is one of these the article on the use of gas in the brewing and bottling industries which will be published in the next week's issue has a message in it for you—a message that tells you some uses of gas which possibly you do not know of at present, and which tells you of the appliances that are available to enable you to put this class of business on your lines.

If there are not any breweries in your territory the article is still worth reading. The bottling industry, even without the intoxicant branch, is a considerable factor in this country, and will be in the future gas business. There is a big possible market there for the alert gas man. You will find it well worth the effort to familiarize yourself with its problems.

Assisting the Gas Range to Do Its Work Efficiently

Improving the efficiency of the domestic gas range has been the source of unceasing study and effort. Despite this there remains a large field for improvement. But we are progressing and it is safe to assume that our range manufacturers will not let up in anywise, in their effort to perfect their product, even though they be hampered in the future as they have been in the past by the prices at which they have been compelled to sell.

But, assuming that they accomplish the impossible, that they attain 100 per cent. perfection, and that consumers operate the ranges as the manufacturer would operate them, would every range render the same efficiency and would that likewise be perfect? It would not. The difference would lie in the cooking utensils employed by the individual user.

A thought is suggested by C. A. Magee in a recent article in the Baltimore Company's house organ, *Gas and Electric News*. He would have the utilities engage more extensively in the merchandising business, and there are valuable suggestions contained in his argument.

Gas is a service even though a commodity. In so far as it is an efficient and satisfactory service will be the proportion of future prosperity the gas industry will enjoy. It does not matter if the weak link be in the range or in the cooking utensil used, if there is a waste, gas will be unable to perform to its best advantage. Some utensils are efficient and some are inefficient. The determination of which is beyond the housewife's understanding. It is, however, a simple task to the engineer.

If the gas industry desired to engage in a philanthropical enterprise it could serve a useful purpose by undertaking a general educational campaign on cooking utensils. In doing this it would, without question, benefit the public, but it would likewise in effect, make the oil range, the coal stove and the electric range just that much more efficient.

Gas companies, however, are more interested, and

rightly so, in perfecting their own services, leaving the task of improving competing services to those who would profit directly by making such improvements. The solution, Mr. Magee hints, is that the gas company should go into the business of selling cooking utensils.

By selling only efficient ones it could assure itself that its gas ranges would perform their functions to the best advantage. Thus, without any improvement to the range itself, there would result an increased efficiency in the cooking operation.

In the opinion of this journal there is more in the suggestion than might appear at first thought. The increased efficiency secured may not be great, in fact may seem almost negligible, but sooner or later we may have to get down to fine points so it is but the part of wisdom to school our thoughts accordingly.

The Benefits to be Derived from the Experiences of Others

Commenting on the recent consolidation of the *Engineering Record* and the *Engineering News*, General W. M. Black, Chief of Engineers, U. S. A., states as follows:

"We older men of the profession can remember easily the difficulties encountered before we had placed before us week by week in the pages of the *News* and of the *Record* the experience gained by others. How often we each had to experiment blindly along paths novel to us, sometimes to ultimate success, but sometimes to failure, without the light of each other's experience excepting that chronicled at long intervals in society proceedings or so old as to become embalmed in textbooks."

General Black refers particularly to the civil engineer. His comment is just as pertinent to the gas engineer and to the company that employs him.

The degree of usefulness the two journals cited had attained in the field they covered is generally known. The possible degree of usefulness the consolidated journals may attain is beyond the power of the imagination to picture. Their processes of attaining the goals they have were very similar. They were founded on the principle of not only developing readers, but of developing writers. Their success was due to the enthusiastic response they received.

If these journals had to depend entirely upon the articles they located and prepared through their own efforts the service they rendered their readers would have been very slight as compared to the service they actually did render. Their field was broad and the most instructive experiences are for a good part of the kind that are not proclaimed abroad.

Each of them succeeded to a high degree in impressing on the individual civil engineer the value of his experiences to others. Considerable of the material they published came into their offices without any direct solicitation whatever.

The gas man has, seemingly, been a reluctant writer. He is, in general, either through a positive disinclination for the work or in self-depreciation, very chary about contributing to the journals in his field. As a consequence, the journals have never attained the value to him they otherwise could have attained.

It is a valuable training to write out a description of one's professional experiences. There is a positive benefit to the man himself in submitting them to a technical pournal. The latter will either publish them or tell him why it cannot do so. In either case he will have gained mentally by the effort.

There is also a perfectly ethical publicity value attached to the publication of a signed article in a reputable technical journal.

We have some very large gas companies. It is certain that their forces include some very capable men. Those higher up in the organization know these men only through their immediate superiors. It may be that one of these men is a genius. He may be in the fitting department, but his genius might tend toward applying gas for industrial purposes.

His immediate superior may be a perfectly prosaic individual who can gauge the man's ability as a fitter quite capably, but the industrial fuel wrinkles he is continually thinking out may pass completely over his head.

Now let us assume that the man wrote out a description of one of these wrinkles his mind is so prolific in formulating and it was published in a gas journal.

The biggest man in the organization reads the journals just as the smallest man does; probably more thoroughly, for the lower grade man seeks information only along certain lines. The big man must keep in touch with the whole field.

It is quite likely that if there is anything especially meritorious in the article under consideration that the big man is going to keep the author's name well in mind. It is even quite likely that he may look him up.

Publicity is of value whether applied to the individual or to the company.

But the benefits the author of this article may derive are not all recounted yet. His article might be read by one who has a similar bent. It might suggest a subject that this man will write upon. The original author then may profit by reading. To the knowledge he has acquired by his own experience he can add that which he may acquire through the experience of the other man.

The managements of the conscientiously edited gas journals are endeavoring to their utmost to furnish their readers with mediums that will be of real, direct benefit to them in the solution of the numerous problems they meet with. It cannot be said that they have failed to attain this object to a commendable degree. But no gas journal can ever hope to attain its maximum possible value to its field until the gas man himself cooperates to a markedly increased degree in assisting it to do so.

(*Continued from page* 419)

The 4-in. welded specimens in Fig. 2 bulged under the high pressure but did not fail in either the weld or the pipe seam.

The mode of failure of two of the screwed connections are shown in Fig. 3. The bursting pressures for the screwed connections were way below that of the welded specimens and all failed in the fitting. Great difficulty was experienced in testing the specimens made up with screwed fittings because sand holes developed, and the water leaked through the castings to such an extent that it was almost impossible to reach the point of rupture. Fig. 4 shows one of the screwed "T" specimens under test and illustrates clearly the leaky condition just mentioned.

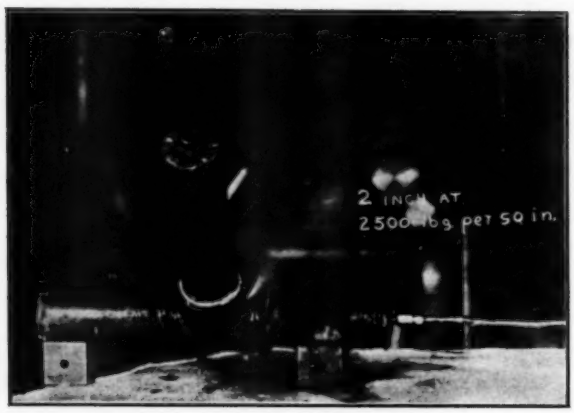


FIG 4. SCREW "T" LEAKING UNDER PRESSURE

Examination of the data given in the table shows that in only one case was there failure in the weld and that was merely a leak which did not develop until 3,850 lb. per sq. in. pressure was applied. This brings out the point that while leaks are much less likely to occur in welded than in screwed connections they are the principal cause of difficulty. Therefore, pipe lines that are to be subjected to high pressure, if properly tested for leaks when installed, should give no trouble under service.

The results of these tests bear out the conclusions given in the previous series, namely:

a. The strength of a welded pipe connection is practically the same as that of unwelded pipe. By slightly building up the weld it can be made stronger than the rest of the pipe.

b. The strength of the welded pipe connection is very much greater than that of the malleable iron screwed fittings.

c. Although a careless or inexperienced operator might produce a leaky joint, nevertheless, if the pipe line is tested for leaks when installed it should give no difficulty in service.

Theory of Coking Process in By-Product Oven—A Correction

In making up the pages in the April 14 issue of this journal the two illustrations in the article entitled "Explain Theory of Coking Process in By-Product Oven" on pages 376-377, were transposed in such manner as to put Fig. 2 in the place where Fig. 1 should have been and vice-versa. Thus the caption under the latter explains the former and the caption under Fig. 2 in the article describes what Fig. 1 shows.

Solve Gas Shortage by Booster Set Installation

To relieve pressure difficulties in certain sections of its territory where existing mains are inadequate, the South Carolina Light, Power & Railway Company of Spartanburg, of which Alex. Wyness, Jr., is superintendent, has installed a booster set which works during the peak load and has given entire satisfaction. For the time being the company is not figuring on any great amount of main extensions due to the high cost of material and the shortage of labor.

HYDRAULIC PRESSURE TEST OF OXY-ACETYLENE AND SCREWED PIPE CONNECTIONS

SIZE PIPE. IN.	TYPE JOINT.	PRESSURE AT FAILURE. LB. PER SQ. IN.	MAXIMUM PRESSURE. LB. PER SQ. IN.	NATURE OF FAILURE.	CONDITION OF WELD.
2	Welded "T"	4,400	4,400	Tube seam split	O.K.
2	Welded "T"	2,200	2,200	Leak in tube seam	O.K.
2	Welded "T"	4,750	4,750	Tube seam split	O.K.
2	Screwed "T"	2,350	2,750	Sand holes in fitting	....
2	Screwed "T"	500	2,000	Sand holes in fitting	....
3	Butt Weld	....	5,300	.....	O.K.
3	Butt Weld	4,950	4,950	Tube seam split	O.K.
3	Butt Weld	....	4,250	.....	O.K.
3	Coupling	3,950	3,950	Coupling split	....
3	Coupling	3,400	4,400	Leak in coupling	....
3	Welded "T"	....	3,500	.....	O.K.
3	Welded "T"	....	4,250	.....	O.K.
3	Welded "T"	....	3,505	.....	O.K.
3	Screwed "T"	350	2,700	Sand holes in fitting	....
3	Screwed "T"	300	3,100	Sand holes in fitting	....
4	Butt Weld	....	5,100	Pipe bulged	O.K.
4	Butt Weld	....	3,250	.....	O.K.
4	Coupling	300	3,000	Leak at threads	....
4	Coupling	750	2,600	Leak at threads	....
4	Welded "T"	3,850	5,100	Leak in weld	Leaked
4	Screwed "T"	1,000	1,950	Sand hole in fitting	....

Special English Correspondence

Monthly Letter from Norton H. Humphrys, Salisbury, England

Prevention of Ice in the Gasholder Tank—Gas Companies' Half Yearly Reports—The Effect of the War on These Reports

The troubles brought about by the presence of ice in gasholder tanks have been very much in evidence during the last severe frost, being aggravated by the general shortage of labor. In one or two instances the holders have become hopelessly ice-bound, and a complete stoppage of the supply of gas was unavoidable. A short account of the methods usually adopted for dealing with this difficulty may possibly be useful.

Many gas engineers recognize as a first principle that ice in the gasholder tank is most emphatically matter in the wrong place, and that it is not so much a question of rapidly dissolving ice already formed, as prevention of the formation in the first place. The expansion during the act of congelation is said to be about 8 per cent., and at any rate is sufficient to cause considerable strain on adjacent parts, or to throw the holder out of level. So the matter should be promptly in hand as soon as the thermometer indications are in the neighborhood of 32 deg. Fahr., without waiting for actual trouble. The same applies to purifier boxes in exposed positions, though the trouble in this department is now minimized by the general adoption of the dry face luteless cover joint as a substitute for the water seal.

When Steam Is Available the Task is Comparatively Easy

If a supply of steam is at hand the matter can be easily handled with the aid of ordinary steam pipe and fittings as stocked at all gas works, by laying a line from the works boiler. This must be very carefully insulated to avoid loss of heat and condensation, as unless the non-conducting material is absolutely dry, it is worse than useless. One of the best plans, in laying a run of steam pipe below ground, is to enclose it in a larger pipe, with distance pieces at intervals of a yard or so to keep it central. A ¾-in. pipe, which in this climate is ample for holders up to 60 ft. in diameter, may be threaded through 3-in. cast or steel pipe, and the outer pipe must be as carefully jointed as the inner.

The steam is connected up to an injector of the form shown in Fig. 1., which is simply a teepiece B, and a short piece of pipe forged to a nozzle C, perforated with an opening suited to the size of the tank, or cup. When necessary it can be cleared by removing the plug and passing a wire through. It is supported by clamps from the top edge of the tank or cup, in the position shown, two or three inches below the surface of the water, and when in efficient action produces a circulating current of ripples or wavelets D, extending all around the tank, with sufficient velocity to float a cork in a complete circuit within ten minutes. The effect of keeping the surface in motion is that freezing does not occur, even if the liquid should fall to a few degrees below 32 deg. in temperature.

It is more important, if anything, to keep the cups clear than the tank, as in cold weather the working of the holder is at the maximum. A branch is continued from the steam supply K, to a height equivalent to half that of the lift, above the tank level. From this point a flexible metallic tube L, long enough to allow full play, is connected to a second injector M, immersed in the cup.

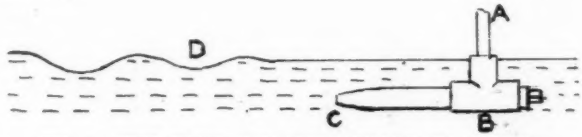


FIG. 1. TEE PIECE AND PIPE FORGED TO NOZZLE

Steam is not in all cases available or convenient. The holders may be at a distance from other parts of the plant, as in the case of district holders. And in small works a gas engine is preferred to a boiler, furnace or chimney, as being cheaper, and requiring less attention in working. Both the cooling water, and the exhaust gases from the gas engine may be used, by means of similar simple devices that readily suggest themselves. If neither gas nor steam are at hand, a small boiler G may be enclosed in a lean-to or other cheap form of protecting structure. It is of the pattern usually fitted in glass plant houses, with a furnace on the slow combustion type adapted to burn coke breeze, that can be left without attention for twelve hours or more. See E. F. G. H. J. The usual flue, flow and return pipes are provided, and the device is shown on ground level in conjunction with a tank entirely above ground. If the tank is partly or entirely buried, it can be sunk a few feet below ground level, in a suitable pit, but need not extend to any great depth, as the return pipe need only extend to a few feet below ground level, and not necessarily to near the bottom of the tank.

It will be understood that Fig. II., includes two distinct schemes, KLM for use when a steam supply is available, and EFGHJ, a self-contained arrangement with circulating boiler G.

Tanks up to 100 Ft. Diameter Can Be Kept Free From Ice By Plant Steam

Engineers who have not tried either of these devices are apt to form an exaggerated idea as to the quantity of steam required, and to conclude that the works boiler, already taxed nearly up to its full power, is not equal to the additional strain. If the capacity is ample, as it ought to be, no trouble will arise. I have found that tanks up to 100 ft. in diameter can be kept free from ice, without upsetting the boiler house operations, and if the demand for gas has overtaken the steam-raising capacity, such expedients as firing with large coke in place of breeze as ordinarily used may assist matters. The advantage in saving of labor, avoiding risk of injury to the holder, and interference with the

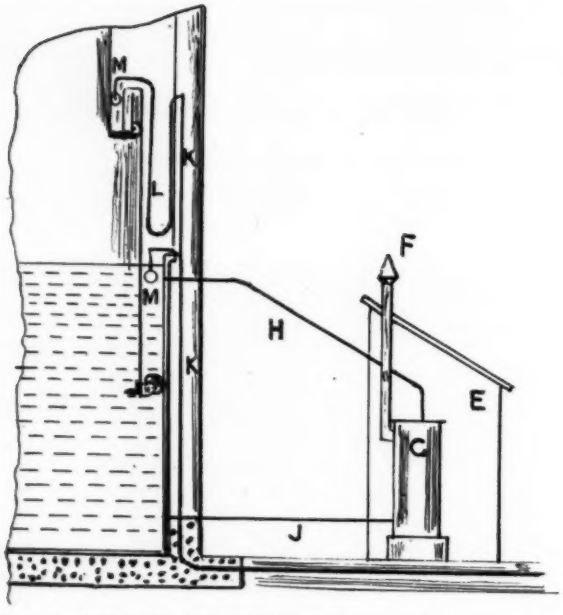


FIG. 2. SHOWING ARRANGEMENT WHEN STEAM IS AVAILABLE ALSO WHEN CIRCULATING BOILER IS USED

proper supply of gas to the district at a time when any deficiency is sure to create a maximum of inconvenience, is sufficient to render the outlay for a special arrangement as shown in EFGHJ, a profitable investment.

The flexible tube and injectors, L,M. being only required during three or four months in the year, are taken off each spring, and stored in a dry place until the following autumn.

Interest in English Reports

In view of various matters to which reference has been made in previous letters, the usual reports and statements of account for the six months ended Dec. 31, 1916, have been looked for with more than ordinary interest, as likely to afford some indication of the means adopted for maintaining the supply of gas under unprecedented difficulties, some of which tend to become more acute, as might naturally be expected, while others have proved amenable, to some extent, to special expedients. They all tell the same tale, with local variations, and in addition allude to the extra strain caused by the recent long spell of cold weather, which has led to phenomenal increases in consumption of gas, in some cases considerably over 20 per cent. These would under ordinary conditions be welcomed, but in present circumstances are by no means an unmixed blessing. High prices for coal, oil, freightage, and materials in general, have reduced the profits below the limits necessary for the maintenance of a safe balance to the credit of profit and loss, after paying the usual dividends and interest, and in more than one instance a further advance in the selling price of gas is foreshadowed. The Gas Light & Coke Company announce an advance of 8 cents per 1,000 cu. ft. bringing the figure up to 81 cents, as from the next readings of the meters, and others will follow before midsummer. But for increased receipts for residuals, especially coke, the market value of which has moved upwards in sympathy with the enormous advances in price of coal, this position would be more prominent.

I may here mention a step decided upon by the shareholders of the Gas Light & Coke Company, as although somewhat of a domestic character, it will command the respectful sympathy and approval of the industry in general. This was the decision to erect a statue of the late Sir Corbet Woodall, executed by an eminent sculptor, at Beckton as being their largest station. It is the more appropriate to say this, seeing that under the new regimé introduced at the instance of the late chairman, the profession at large has both seen and heard much more about the operations and working of the largest gas undertaking in the country, than they were able to do previously.

Demand for Gas Has Shown an Increase

The demand for gas has not only been well maintained, but on the whole shows a slight increase, notwithstanding the fact that lighting restrictions are responsible for a reduction in demand that is somewhere in the neighborhood of 15 per cent. Since the outbreak of war the price of coal has not only gone up quite 100 per cent., but the quality has seriously depreciated. The complaints of gas engineers on this score are strongly re-echoed by the average householder, and those who formerly preferred coal to coke as cleaner, less dusty, and giving less ash, now find that there is practically not much difference between the two. Also the public is not slow to appreciate the fact that gas has only been advanced about 20 per cent. in price, as shown by the large demand for new service supplies and cookers on hire. The war is a National calamity, but a splendid advertisement for gas.

On Actual B.t.u. Basis Manufactured Gas Would Have to Sell at 25 Cents per 1000 to Compete with Oil as a Fuel

Fuel oil is the closest competition gas companies have in the industrial field, but we have been able through superior service and better application to take in the last few years a large amount of business by replacing fuel oil with gas, declared R. A. Ziegler, division manager of the Central Indiana Gas Company at Anderson, in a paper presented at the recent annual convention of the Indiana Gas Association.

For a basis of comparison, we will consider fuel oil of 125,000 B.t.u.'s per gal., costing 5 cents. At this figure there are certain classes of business where 90 cents to $1 artificial gas is preferable, such as tempering furnaces, tool hardening, Babbit melting furnaces, lacquer and japanning ovens, tire shrinking, preheating castings for oxy-acetylene welding, soldering iron heaters, china kilns, etc., while for larger furnaces, lehrs for tempering glass, etc., a very much lower price would be required. There is a large class of business that can be successfully operated on 600 B.t.u. gas when proper application is made. A few of these prospects are annealing furnaces, shaping, welding and bending furnaces, blank heating furnaces for bolts, furnaces for melting brass, bronze, aluminum, gold, silver, nickel, etc.

In a great many cases, fuel oil is used in a very wasteful manner. Floor space is limited, storage capacity sufficient in size for 30 days operation must be maintained, extra compressed air capacity needed, together with the fire risks, gives the gas man an opportunity to secure the business, notwithstanding the fact that artificial gas to compete on actual B.t.u. basis would have to be sold for 25 cents per thousand as compared with fuel oil at 5 cents per gal.

Substitution of Mantle Lamps for Open Flame Burners Insures Lighting Business for Gas in Holyoke Church

Original Side Wall Brackets Retained in New Lighting Installation—Total Absence of Glare a Characteristic Feature

By M. A. CADIEUX

City of Holyoke Gas and Electric Department

That gas lighting can be as efficient as any other form of artificial lighting has been many times demonstrated. A new proof of this has recently been added in the very satisfactory equipment of the Unitarian Church in Holyoke, Mass., with a modern system of gas lighting.

The original equipment of this church consisted of single and double side wall brackets and three ring burners, all equipped with open flame burners. The yellow flicker of these open flame burners, reflected on a dark oak ceiling, cast a weird, ghastly light which was very trying, to say the least.

As this church is to be replaced with a new church some time in the very near future, it was a great relief to the pastor, Rev. A. H. Coar, and the congregation to find that a very satisfactory gas lighting could be obtained, and at a very low cost.

The two ring burners at the front of the church were replaced by two No. 6 Welsbach Reflex lights, one on each side of the pulpit, and as the existing side wall brackets were of good style, it was only necessary to add incandescent lamps of the C.E-Z type to turn gloom into joy.

Two more Reflex lights, similar to those in the front of the church, furnish ample light for an assembly room about 20 ft. square, and, in the two small parlors, the original center clusters were retained; three C.E-Z lamps being placed on each.

All of these lamps are equipped with pilot lights so that the lighting of the church is effected very quickly and with no trouble.

The soft mellow light of the gas mantles is very pleasing and restful to the eye, there being a total absence of all glare.

The pastor and congregation seem highly pleased with the transformation, many possibly not having been aware that satisfactory gas lighting was possible, but "seeing is believing."

Generates District's Electric Supply by Producer Gas Engines

The Roswell (N. M.) Gas & Electric Company which supplies electric current for a city of 8,000 and for pumping, etc., in the surrounding agricultural district places its main reliance for power on producer gas engines.

The electrical generating equipment comprises three 250 kw. gas producer sets and a 500 kw. auxiliary steam turbine, the gas producers carrying the load during the irrigation pumping season and the turbine from October to December while the gas engines are being overhauled and also at peak load throughout the year.

An efficiency as high as 4 kw.-hr. per pound of coal has been obtained. The six gas producers are of the Westinghouse double zone type, with down draft produced by a suction fan at the gas off-take. Each producer consists essentially of a brick-lined steel shell, 17½ ft. high and 10 ft. square.

The gas is cleaned by a preliminary spraying in the take-off pipe, then passes through the wet scrubber and then through a dry scrubber, being drawn through the producer and scrubbers by a cycloidal blower discharging into the gas distributing main, which supplies the gas engines through a convenient valve system. Duplicate sets of blowers are provided as a service insurance.

These producers supply gas to three 250 kw. Westinghouse gas engine driven generating sets, two of the engines being vertical and one horizontal. In addition there is a 100 kw. gas engine set at the company's gas plant which supplies current in case of emergency.

The coal used is a good grade of bituminous, obtained from Raton, which is situated in the northern part of the state.

Rates are based upon a monthly readiness-to-serve charge of $1 per connected horsepower during the irrigation season, plus 4½ cents for the first 500 kw. hr., 4 cents for the second 500, 3½ cents for the third and 3 cents for all in excess of 1,500 kw.-hr., there is then allowed a 1 cent per kw.-hr. discount for prompt payment of bill.

Lack of National Advertising Handicaps Gas Company in Competing with Electricity

The electric industry interests are great advertisers. There are half a dozen large companies that do national advertising, concerned in the manufacturing of electric apparatus, declared C. N. Chubb, manager for the South Bend District of the Northern Indiana Gas & Electric Company, in his paper at the recent annual convention of the Indiana Gas Association. Their products are used in all parts of the country; the local company or salesman is simply their agent.

This advertising, in addition to what is done by the local companies and sales stores, keeps the public constantly informed of the many devices electrically operated that afford conveniences and comfort to users of electricity.

The gas company does not get this free publicity. Consequently it behooves the gas man in his local situation to keep abreast of the times, to keep the gas company in the foreground, to keep his appliances and the uses of gas constantly in the minds of the public, to keep his office and show-room in an attractive condition, and last, but of the utmost importance, not to allow the public to get the impression that gas is getting to be a back number and that to be modern one must use electricity.

This is one of the electric man's strong arguments. To prevent any such erroneous idea becoming prevalent, the gas man must be up and alive, with up-to-the-minute appliances of all descriptions. The gas company should be one of the livest units of a community. Remember, impressions count. For example, we claim to have the best show windows in the city; we not only live up to the reputation, but boast about it. What happens? We receive suggestions quite frequently from our consumers for appropriate window displays, many of which are really good.

News of the Gas Industry

Leak Survey Enables St. Louis County Company to Cut Leakage in Half

A leak survey recently completed by the St. Louis County Gas Company, Webster Groves, Mo., of which J. E. Hillemeyer is general superintendent, has resulted in cutting in half the total percentage in send out. Though such surveys are expensive and this one covered the entire system throughout the county, the results have been such as to convince the company that they pay.

Sheridan, Wyo., Plant to Begin Operation About May 1

The Sheridan, Wyo., gas plant—construction of which was described in this journal, Oct. 30, 1916, page 277—has been practically completed and will be put into operation about May 1. The plant is especially of interest in that it will use the local sub-bituminous coals of Sheridan County, mined only fifteen miles away.

The retort benches were built by the Improved Equipment Company of New York City. The condensing apparatus was supplied by the Steere Engineering Company of Detroit, and D. McDonald & Company of Albany furnished the station meter which is a Hinman drum. The Pierce-Bacon Engineering Company, Central Savings Bank Building, Denver, designed and constructed the works.

Employees Ask 8-Hour Day

An appeal for an eight-hour working day was made by the employees of the Providence Gas Company at the Sassafras Point plant recently and upon being told that their request would be considered by officials, went back to work. Answer to their request will be forthcoming shortly. The men made their demands upon T. H. Hintz, superintendent of the plant. The men now work ten hours a day and ask that they receive the same pay for working eight.

Men at the plant said that all classes of employees were in the delegation that waited upon the superintendent. They said that the matter had been under discussion for a month or more. Two hundred and twenty-seven men are employed at the plant.

California Commission to Establish Company Regulations

An investigation to establish a standard set of rules for the operation of all gas companies in California has been instituted by the railroad commission of the state. When completed all gas companies will be under standard regulations concerning the heat units of their product, the attitude toward the public, the reading of meters and the manner of maintaining equipment.

A set of preliminary rules has been adopted by the railroad commission and arrangements made for the holding of hearings in order that suggestions may be made by the gas companies before the new regulations are finally fixed.

Novel Poster for Buffalo Convention

The unique manner in which the Natural Gas Supply Men's Association has begun to advertise its convention which is to be held at the Broadway Auditorium in Buffalo, May 14, 1917, is worthy of the considerable comment which it is sure to get.

It is printed in red and black and is about 22 in. wide by 28 in. long, with a heading which reads "$100 Cash Prizes." The entire story is told in a semi-humorous manner, and is illustrated with caricatures of the man who went to Buffalo and came back with the prize.

The twenty questions, the best answers to which win the prizes, are given with some general information regarding the contest.

The posters are being sent out broadcast among the members of the association, with the request that they be posted in conspicuous places. They may be obtained from Larmour Adams, secretary of the Natural Gas Supply Men's Association, First National Bank Building, Fittsburgh, Pa.

Biggest Attendance in Association's History Indicated for Southern Convention

With room reservations totalling over 160, and basing the attendance on advance reservations for previous conventions, the largest attendance in the association's history is indicated for the Southern Gas Association Convention to be held at Roanoke, May 2, 3 and 4.

Oil Tanks Destroyed in Jersey

Two crude oil and naptha tanks of the Seaboard By-Products Company's plant near Kearney, N. J., exploded Sunday night, April 22. The report, which was heard for some distance, caused considerable excitement, and the fire destroyed some of the surrounding buildings.

One machine shop and the pump house of the company were destroyed by the fire, along with the two large tanks. The damage is estimated at $100,000.

The plant was started two years ago to provide gas for the Public Service Company's power house, with coke as a by-product. Later it was decided to make benzol, the principal product of the plant, and for the last year the H. Koppers Company has been extending here, in connection with the Seaboard company.

Examination of Mains on Public Property Ordered by Mayor of Chicago

Orders to examine the condition of gas mains in front of every building owned by the city were issued recently by Mayor Thompson after a length of pipe taken from the scene of the recent Halsted Street accident had been shown to him.

Although the pipe had been in the ground only six years, according to the records of the People's Gas Light & Coke Company, it was badly eaten.

The mayor ordered an expert examination of the pipe to determine whether it had been decomposed by electrolysis.

Massachusetts Company Petitions for Stock Increase

The Newburyport Gas & Electric Light Company has petitioned for permission to increase its capital stock by the issue of 1,710 new shares of a par value of $130. There are now outstanding 3,420 shares of a par value of $100 each. On this basis the capitalization of the company would be $666,900. Formerly there would be serious objections to any further expansion of the gas and electric company's stock, but in view of the extensive and costly additions which have been made to the plant and service within the past year, which are apparent, there is likely not to be any local opposition.

New Gas Well Struck in Crawford County, Ark.

A 4,500,000-foot gasser was brought in recently on the J. B. Kibler farm, Fort Smith, Crawford County, Ark., by the Clear Creek Oil & Gas Company. Fear of striking water and ruining the well caused the drillers to stop work with the bit but a few feet in the big pay sand.

This is the second well the Clear Creek Company has brought in on the Kibler place. The first was the discovery well of the Kibler field, and was good for about 10,000,000 feet.

Billing Systeml Changed at Springfied, Ohio

Under a new system of billing adopted by the Springfield (Ohio) Gas Company, the statements of the meter readings formerly left at the time when the meters were read, will be dispensed with, and in their stead, post cards will be mailed to each consumer from the office before the first of each month.

In order to save time by avoiding delay when the bills are paid, the company urges that this post-card statement be brought or mailed to the office or pay station with the remittance.

For the convenience of gas consumers the company has arranged with the First National Bank in the Bushnell Building to accept payment of gas bills during business hours for the first five days of each month. Bills may also be paid at the office, as previously, during this period.

After the fifth day of each month payments will be accepted at the office or at the pay stations, the pay stations being in operation on the 8th, 9th and 10th of the month. The hours at the gas office are from 8 o'clock in the morning until 5 o'clock in the evening, with the exception of Saturday, when the office is closed at noon.

Louisville Company Takes Up Garden Idea

The Louisville (Ky.) Gas & Electric Company has sent to each employee the following notice in an effort to encourage gardening:

"Our country is at war; many men are privileged to bear arms, others are unfitted by age or physique to serve as active soldiers, but every one can do something to aid the country in its hour of need.

"The production of food is the most important service next to actual fighting. Every pound of food that you raise for yourself is one less pound you will have to buy and consequently a pound that remains for the soldiers who must have it. Make a Garden.

"It requires a very small garden space in the rear yard to supply a family with its entire requirements of fresh vegetables. A bountiful supply of vegetables close at hand where they may be secured in a few moments is of even more importance than money value.

"A half hour's exercise in the garden before breakfast, or before the evening meal, is a form of recreation which beats any spring tonic ever prescribed. It lends zest to the appetite and improves you both mentally and physically. Every healthy man should have a hobby. Make your garden your hobby this spring. Cultivate a garden if you have but ten square feet of space.

"Packages of assorted seeds will be furnished free to employees upon application to heads of departments, provided the employee making application intends planting the seeds in his own garden. A substantial prize, to be announced later, will be awarded to the employee producing the best results. In awarding this prize the size of the garden will not be considered, but the prize will be awarded to the garden which is best kept and which produces the best results per square foot.

"Seeds will be ready for distribution April 20. Start at once to spade up your garden space and get ready for planting.

"Any employee not familiar with gardening will receive free of charge a booklet entitled 'The Home Vegetable Garden' upon application to the Commercial Department."

Robert Montgomery, who is the leader of the plan at Louisville, is setting an example by utilizing his garden space to the limit. He is full of enthusiasm about the plan and says:

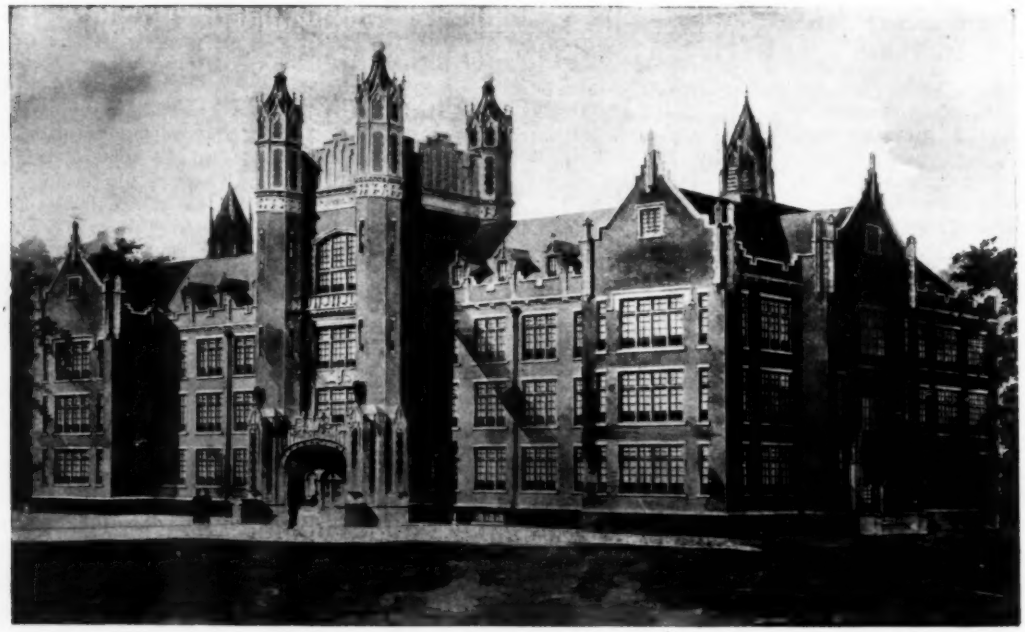
"I find gardening to be a great recreation and anticipate much pleasure as the result of my labors."

Employees to Help Send Two Ambulances to France

Employees of H. M. Byllesby & Company are subscribing to a fund, inaugurated by Robert J. Graf, secretary, to send two or more ambulances to the American Field Ambulance Corps, which has done such wonderful work on the French front during the progress of the present war. It is estimated that each $2,000 received will purchase one Ford chassis upon which is mounted an ambulance body and equip it with three stretchers, pay for maintenance of the ambulance for a year and the cost of the driver. One such ambulance has already been ordered and will be shipped immediately. Another will be sent as soon as the necessary contributions have been received.

California Company Beginning to Serve Distant Branches

The Southern Counties Gas Company has begun about three miles of extensions into rural districts around Pomona, Cal., for the purpose of serving natural gas to ranchers for farm engineering. Work has been started on a 1980-foot extension of two-inch gas pipe on Gladstone Avenue from Grand and Moreno Avenues and for some distance on Moreno Avenue in the Lordsburg district. Within sixty days the company will undertake a 5,100-foot extension into the Chino ranch district southeast of Pomona. It will also extend its Chino main in order to serve the George Junior Republic with gas for every purpose. The Chino ranch extension will be made to furnish power for irrigation pumps. The company expects to deliver natural gas to every ranch in this valley in the course of time.



ONE OF THE WINTHROP NORMAL AND INDUSTRIAL COLLEGE BUILDINGS WHERE GAS HAS SUPERSEDED GASOLINE

Sale of Varied Gas Appliances Made Possible by Replacing Gasoline Gas Machines in Southern College

The sale of 30 gas irons, 4 mangle iron burners in the laundry, 2 Dietician stoves and an incinerator in the hospital, the installation of 68 burners in one laboratory and 46 in another, 8 gas irons in a model laundry and 80 domestic science burners and 2 four-section bakers ovens, as well as a kitchen heater, a heat holder equipped with cooking top and broiler, a tank water heater and a large cabinet range, were made possible by the substitution of gas by the Rock Hill Gas Company of Rock Hill, S. C., of which E. R. Guard is superintendent, for three gasoline gas machines in the Winthrop Normal & Industrial College at Rock Hill. Besides this the gas company has installed 3 five-mantle arcs in the power house, and expects to install 60 or more throughout the different buildings.

The college is a state institution with an enrollment of 1,085. In addition to the college proper, it operates a training school with an enrollment of about 300, running from the kindergarten up through the high school, where the girls who wish to teach are given training and acquire a practical knowledge. They also operate a training home where the girls are sent in classes of 14 to learn the art of housekeeping, and are trained in model housekeeping from the kitchen to the attic.

New Business and Improvements of Muscatine, Ia., Company

The Muscatine Lighting Company has secured a new industrial consumer in a large manufacturing company which is now putting out a new steel pulley. An industrial gas furnace has been installed here, and a large increase in consumption is expected.

The company is also contemplating refilling two new benches of sixes for the manufacturing of coal gas at the Muscatine plant. This journal is indebted to F. S. Dewey, general superintendent, for the foregoing information.

Corporation to Buy Oil and Gas Lands

The United Gas & Electric Corporation has completed arrangements for the purchase of a half interest in about 514 acres of producing oil and gas properties in the Augusta pool, Butler County, Kan.

Bituminous Coal and Beehive Coke Report

According to the report prepared by C. E. Lesher of the U. S. Geological Survey, the increase in shipments of bituminous coal in March, 1917, compared with February, 1917, was 16.5 per cent., and compared with March, 1916, was 8.8 per cent. The average number of cars of coal per working day was 19,669 in March, 1917, against 19,817 in February, 1917, and 18,085 in March, 1916. The increase in March over February, 1917, was due to the greater number of working days. On all the groups of roads shown more cars of coal were loaded in March, 1917, than in March, 1916, which had the same number of working days. An improvement in the car supply in the East is indicated by the increase of 6 per cent. in the average daily loading on 22 roads in Pennsylvania, West Virginia, Virginia, Maryland, and Ohio, in March over February. The average daily loading on 16 roads in Illinois, Indiana, and Michigan decreased 10 per cent. and on 17 other roads 15 per cent.

The shipments of beehive coke in March, 1917, showed an increase of 35.3 per cent. compared with February, 1917, and a decrease of 10 per cent. compared with March, 1916.

Valuable Facts for Oil and Natural Gas Drillers

U. S. Geological Survey Reports on Chemical Relation of Oil and Gas as Analyzed from California Oil Fields

Work in the California oil fields by the United States Geological Survey of the Department of the Interior has developed some interesting facts which will doubtless be of considerable benefit to the oil industry. It has long been recognized that oil and gas are commonly associated with water, but of the chemical relation between the two little has been known. It is now possible, at least in California, according to the survey, to estimate the position of oil and gas, where present, from a chemical analysis of the water encountered by the drill. Thus in drilling a "wildcat" well an indication of the presence or absence of oil and gas below the water may be had by analyzing the waters successively encountered, since investigations have determined that the deep-seated waters associated with oil in California fields are different in chemical composition from the waters found near the surface as well as from the deeper waters outside of the oil fields. In some areas a significant change in composition may be detected as much as 1,000 ft above the oil. In others the upper limit of alteration may be within a few hundred feet of the oil.

Possible to Determine Source of Water Flooding Well

It is also possible to determine, at least in a general way, the source of the water flooding an oil well. In the Westside Coalinga field, for example, the horizon of the water may thus be determined rather definitely; in the Midway-Sunset field, where the distinctions are less sharp, the success of this method will depend largely on the number of authentic analyses that are available for comparison.

In the oil fields of the San Joaquin Valley water-bearing sands are generally encountered above, below, and in many places in the oil measures, and in these fields it is difficult to prevent the water, which may be under high pressure, from invading the oil sands and thus ruining a considerable tract of oil land. The United States Geological Survey accordingly detailed G. Sherburne Rogers to make a study of water conditions in these fields, with special reference to the chemical character of the waters. Some of Mr. Rogers' conclusions, drawn from a study of several hundred analyses of water from different depths, follow:

Results of Several Hundred Water Analyses

1. Although some of the oil-field waters are as salty as sea water, and are probably true fossil sea water, others are not even slightly salty to the taste. The distribution of salt is controlled by the freedom of circulation of the waters, which is governed chiefly by the geologic structure.

2. Although the surface and shallow ground waters are strong sulphate or "gyp" waters, sulphate diminishes in amount as the oil measures are approached and finally disappears. Outside the oil fields, however, large quantities of sulphate are found in even the deepest waters.

3. The waters a short distance above the oil at many localities are "sulphur waters," containing the gas hydrogen sulphide, but the shallow waters and those in the oil measures generally contain no sulphide.

4. Carbonates, which are subordinate in the shallow waters, increase in amount as the oil zone is approached, and if no chlorides are present constitute the only dissolved salts in the waters associated with the oil.

These conclusions appear to be well grounded for California, and probably hold for other arid regions in which the upper waters are sulphate or "alkali."

Chemical Action of Water on Oil.

The progressive alteration of the water as oil is approached is so constant and so striking in the area examined that the conclusion that the oil and water have reacted chemically can not be avoided. It was suggested long ago in the Russian oil fields that hydrocarbons are able to reduce sulphate to sulphide, and that they themselves are simultaneously oxidized to carbon dioxide or carbonate. The reaction has not yet been checked in the laboratory, however, and though essentially correct is probably much more complicated than has been supposed.

Some of the sulphide formed in the reaction between the hydrocarbons and the sulphate waters is undoubtedly oxidized to sulphur. Some of this sulphur is taken up again by the oil, which makes the oil heavier and more asphaltic. In the oil fields of San Joaquin Valley the oil that has been most exposed to the action of the water generally contains the most sulphur and is of the highest gravity. It seems probable that the natural gas is also affected by these reactions, and that some of the carbon dioxide formed is not taken up by the waters but mixes with the gas and thus lowers its heating value. The gas nearest the outcrop of the oil sands, where sulphate water can most readily enter the strata and where the reaction would most naturally be most vigorous, may contain as much as 35 per cent of carbon dioxide.

Preliminary Report Just Issued.

A preliminary report on California oil-field waters, containing a number of analyses and a discussion of the principles that control the chemical variations in the waters, has just been issued by the United States Geological Survey as Bulletin 653, entitled "Chemical relations of the oil-field waters in San Joaquin Valley, California," by G. Sherburne Rogers. This report also points out how the principles set forth may probably be put to practical use by oil operators. A copy of the report may be obtained on application to the Director of the U. S. Geological Survey, Washington, D. C.

New Corporations

Union Utilities Company, Chicago, produce and distribute artificial gas and its products and conduct a general utility business, $1,000,000; Burrel J. Horn, E. B. White, G. M. Morley, Chicago, Ill.

Maryland Oil & Gas Company, Kansas City, Kan. Capital, $15,000.

The Mahoning Oil & Gas Company, Youngstown, Ohio; $85,000; F. A. Hartenstein, H. H. Hartenstein, N. J. Rosenbaum, H. W. Brunswick and C. Thornton.

Houston Gas & Fuel Company, Houston, increasing the capital stock from $2,000,000 to $2,100,000.

Buffalo Oil & Gas Company, Enid, Okla. Incorporators: O. E. Criswell, H. S. Kohlbush, B. H. Woodring.

The Climax Oil & Gas Company, Piqua, Ohio, $25,000. L. R. Emerick, A. G. Kerns, J. E. Morgan, Edward H. Allen, C. E. Hetherington.

Murdock Oil & Gas Company, Chickasha, Okla. Incorporators: J. P. Wolverton, T. H. Williams and B. W. Fesler, Chickasha. Capital, $25,000.

Suagee Oil & Gas Company, Delaware. Incorporators: C. E. Waltersheid, Delaware; F. L. Waltersheid, Nowata; B. C. Martin, Delaware. Capital, $3,000.

Success Oil & Gas Company, Louisville, Ky. Capital, $1,500. Incorporators, Antonio de Pasquatle, A. Frees and C. G. Schott.

Murchison Oil, Gas & Water Company, Murchison, Tex. Capital stock, $8,000. Incorporators, Dr. E. F. Ruddle, M. A. Asher, J. W. Splawn and others.

The Texas County Oil & Gas Company, Hooker, Okla. Incorporators, B. S. Neff, L. C. Blackmer, D. B. Almond, all of Hooker. Capital, $200,000.

The Reynolds Gas Regulator Company, Anderson, Ind. Capital, $60,000; pressure regulators. Directors, Milton G. Reynolds, Jacob C. Groble and Carrie B. Reynolds.

The San Juan Oil & Gas Company, Muskogee, Okla. Capital, $11,000. Incorporators, I. T. Wysong, A. A. Coupand, M. L. Wysong, Muskogee.

Dover Oil & Gas Company, Steubenville, Ohio. $10,000. Isaac Rice, M. A. Levinson, Harry Dunn, Harry Levinson, Ralph Levinson.

Hughson Oil & Gas Company, Vinita. Capital, $10,000. Incorporators, J. R. Carter, F. L. Hughson and E. L. Shaw, Vinita, Tex.

O. & A. Oil & Gas Company, Muskogee. Capital, $50,000. Incorporators, Vin Truman and J. E. Ellison, Muskogee, and J. Clements, Little Rock, Ark.

Gold Dollar Oil & Gas Company, Oklahoma City, Incorporators, J. J. Hotaling, W. R. Pruitt, E. R. Stewart, all of Oklahoma City. Capital, $100,000.

Vendome Oil & Gas Company, Oklahoma City. Incorporators, Thomas J. Collins, M. M. Collins, B. C. Marshall, all of Oklahoma City. Capital, $100,000.

Personal Notes

J. M. McDowell and M. R. Bump are new directors of the Cities Service Company, succeeding A. Bevin and C. T. Brown.

The Connelly Iron, Sponge & Governor Company, previously located at 127 Duane Street, moved on April 27 to their new location, 227 Fulton Street, New York City, to meet their increased business.

L. C. Boyd, vice-president of the Indianapolis Gas Company, Indianapolis, Ind., will attend the meeting of the board of directors of the Chamber of Commerce of the United States, which will be held in St. Louis, May 3, 4 and 5.

Daniel L. Turner has been appointed chief engineer of the New York Public Service Commission. He has been acting chief of the commission since last November, when Alfred Craven, now consulting engineer, retired.

R. G. Allsier has been elected director on the board of the Columbia Gas & Electric Company, Huntington, W. Va.

Robert Lindsay, superintendent of the New Bedford (Mass.) Gas & Edison Light Company, expects to give a lecture on "The Extraction and Fixation of Nitrogen from the Air" at the next meeting of the Chemists' Club of New Bedford, to be held May 9, in the Medical Library rooms at the New Bedford Public Library.

G. W. Vaughan, formerly of the Massachusetts General Gas & Electric Company, has entered the employ of the Old Colony Gas Company, Braintree, Mass., as one of its auditors.

H. B. Griffin has joined the sales force of the Ogdensburg (N. Y.) Gas Company. Mr. Griffin has had about eight years' experience in this class of work, being formerly with the Syracuse (N. Y.) Lighting Company and the J. G. White Management Corporation.

V. A. Miller, superintendent of the Canandaigua (N. Y.) Gas Light Company and the Ontario Light & Traction Company, has been appointed superintendent of the Rochester (N. Y.) Railway & Light Company's transportation department, taking over the duties formerly looked after by Mr. Hellen.

F. A. Bond has recently entered the employ of the Rochester (N. Y.) Railway & Light Company as an engineer at Station East. Mr. Bond is a graduate of Colgate University and was formerly with the United Gas Improvement Company, Philadelphia, Pa., and the Philadelphia Suburban Gas & Electric Company, Chester, Pa.

Albert R. Hall, cashier of the Buffalo (N. Y.) Gas Company, was recently honored at the completion of fifty-five years of active service with the above company, by being presented with a purse of gold as a gift from the officers and his office associates.

Harry T. Donovan, inspector of meter readers of the Rochester (N. Y.) Railway & Light Company, was recently transferred from this department to the industrial sales department.

Stewart Swift of South Haven, Mich., has recently joined the office force of the Rochester (Minn.) Utility Company and will take charge of the new business department, which he will organize. The company is also planning to branch out and improve its service in many directions.

Societies and Associations

The Pittsfield Coal Gas Company recently conducted a "ladies' night" in connection with the show and demonstration which this company has been making in an effort to secure the gas service in Lee, Mass. A party comprising more than 130 persons left the Pittsfield office in two special trolleys which took them to Greenock Inn, Lee, where a special beefsteak supper awaited them. This was declared a fitting climax to their efforts to secure the good will of the prospective customers in Lee.

The Gas Meeters dinner-dance which was to be held at the Aldine Hotel, April 24, was postponed, and is expected to be held about the middle of May.

The New York & Richmond Gas Company, Stapleton, S. I., offered several gas ranges as prizes at its first annual ball of the Employees' Mutual Aid Association held recently at the Lyceum, Stapleton.

The New Britain Gas Light Company, New Britain, Conn., recently held its annual banquet at Bardeck's Hall, at which there were about forty employees present. Manager Harold T. Sloper acted as toastmaster and speeches were delivered by H. F. Hodge, James Kennedy, Henry Rice, Henry Hastings, Thomas Taylor and William Sikora.

The Old Colony Gas Company, Braintree, Mass., recently held its regular monthly meeting of the department heads and employees, at which over thirty of the employees were present. Ralph Gardner read a paper on the technique of gas manufacture. E. M. Vaughn gave a stereopticon lecture on many interesting places and events in California.

Terre Haute Industrial Installations

The industrial gas department of the Citizens Gas & Fuel Company is still making strong headway in the development of this field and in the encouragement of a greater utilization of gas by present customers. During February, according to a report printed in *The Bulletin*, P. M. Spanogle of that department closed a contract with the Standard Wheel Works, Terre Haute, Ind., which brings a consumption of 2,400,000 cu. ft. per year through the heating of core ovens. In order to close this contract a complete set of blue print specifications were prepared and the equipment had to be made to measure, for there were no stock appliances that would meet the requirements. At the same time a brass melting furnace was also installed for use in this factory.

Other profitable industrial contracts were closed last month, including three special burners for bottle necks and an oven furnace for the Root Glass Company, with an annual consumption of 942,000 cu. ft. per year, a Blodgett oven for baking veal loaves and a blast branding iron for the Home Packing Company; also two burners for dye heating in a papier-mache factory. C. B. Cummings of the same company signed contracts for a 2-section hotel range that will consume 500,000 cu-ft. per year, four Circo banana room heaters, one hotel broiler and cake griddle, two brazing burners, one 1½-h.p. gas fired steam boiler and a specially constructed spring tempering furnace with an estimated consumption of 120,000 cu. ft. per year. The total estimated consumption from all these industrial contracts which were closed in February aggregates 4,666,000 cu. ft.

Increased Use of Artificial Gas

In the 17 years from 1898 to 1915 the consumption of artificial gas from by-product coke ovens and from coal, oil, and water gas plants increased more than fivefold. Very significant is the increasing use of artificial gas for fuel, and, since 1908, its decreasing use for illumination. The by-product coke oven saves the gas; the old beehive coke oven wastes it on the atmosphere.—*U. S. Geological Survey, Department of the Interior.*

Connecticut Company Improves Its Offices

The office and salesroom of the Rockville - Willimantic (Conn.) Lighting Company, on Park Street, Hartford, has undergone extensive improvements and presents a most attractive appearance. It is one of the most modern and up-to-date offices in the State at the present time. All partitions have been removed and the office converted into one big room. It has a roomy, cheerful and inviting appearance. All the woodwork has veen varnished, the ceilings painted, the windows lowered and hardwood oak floors laid and concealed piping installed for display purposes. In the rear of the room a handsome counter with a rosewood top has been put in and inlaid linoleum laid on the floor. Brascolite lights have also been installed. Unusual opportunity is now afforded for the display of goods. Frank Hutchinson had the contract for the woodwork, Frank Williams for the painting, and Frank H. Burke for the linoleum for entire flooring.

Plant Waste Harmful to River Fish

In response to a letter written the Utah Gas & Coke Company by R. H. Siddoway, state fish and game commissioner of Utah, calling the company's attention to the evil effect of permitting waste from its plant to run into the Jordan river, officials of the company assured Mr. Siddoway that the trouble would be remedied at once. Cesspools will be dug to take care of the coal tar-impregnated waste and it will not be permitted to run into the stream.

The gas company officials told Mr. Siddoway that they had been ignorant of the true conditions and expressed pleasure at being told of them.

68 Garden Plots for Citizens Gas Company Employees

J. D. Forrest, general manager of the Citizens Gas Company, Indianapolis, Ind., has called attention to what that company has done and is doing along that line. In a letter to a local newspaper, Mr. Forrest says:

"The Citizens Gas Company plowed a large tract of land more than a week ago, and has laid out at its Prospect Street plant sixty-eight garden plots that are being worked by the employees of that plant during their spare time before or after their regular hours of duty.

"A great deal of enthusiasm has been shown in this movement and there were applications for more garden plots than the spare land of the company could provide. We have made arrangements to utilize some vacant land laying between the plant and Prospect Street and expect to bring the number of our gardens up to one hundred within the next few days. The land which we have plowed up has been growing alfalfa for a number of years, and ought to be as fine garden land as can be found in the county. The company has undertaken to do the plowing and the men understand that if any of them neglect their gardens the gardens will be taken away from them immediately and turned over to others who will look after them properly."

Boston Output Record Increases

The gas output of the Boston Consolidated Gas Company for February was 515,897,000 cu. ft., an increase of 4.9 per cent over February a year ago, although the comparison is with a 29-day month last year. The January output was 589,541,000 cu. ft., a gain of 10.9 per cent. over the same month a year ago.

Stock Increase Wanted by Ohio Company

The Ohio Cities Gas Company's officers intend to ask the stockholders at the annual meeting on June 5 to authorize an increase in the common stock equal to an amount more easily representing the actual value of the assets. Under the laws of Ohio a corporation cannot increase its capital stock until all previously authorized stock has been issued, and for this reason it was necessary to issue the stock just listed on the Stock Exchange before increasing the present capitalization.

Massachusetts Company Has Good Output Report

Old Colony Gas Company output for the month of March, 1917, was 7,373,000 cubic feet, as compared with 6,005,000 cubic feet for the same month of the previous year, an increase of over 22 per cent.

THE MILFORD GASLIGHT COMPANY, of Milford, Mass., has asked the selectmen for leave to erect structures or buildings for the storage of oil products on its property on Pond Street.

Construction Notes

New 20-In. Line Will Enable St. Louis County Company to Send Out from 30 to 35 Per Cent. of Its Output at Low Pressure

The St. Louis County Gas Company, of which J. E. Hillemeyer is general superintendent, is at present engaged in the installation of a 20-in. low pressure main, approximately one mile long, extending from its works holder to the low pressure system, which is supplied through district regulators from the high pressure transmission main of the system. This will enable it to send out about 30 per cent. to 35 per cent. of the output low pressure without recompressing it. To furnish proper pressure regulation, a tandem automatic and balance governor or regulator is also being installed at the works. It is expected that this will be installed and operating by July 1.

Great Amount of Construction to Supply New Consumers to Be Done by Denver Company

Construction work of the Denver Gas & Electric Light Company incidental to the supply of gas to new customers bids fair to break all records during the coming summer. Work is now underway on the installation of about a mile of 2-in. and 6-in. mains to supply fifty consumers in a new district, while other short extensions in the hands of the construction department at the present time will equal about the same amount of pipe and number of customers.

As the franchise area of the company is well covered with gas mains and the consumers per mile of main unusually high, the company does not anticipate making any spectacular main installations, while at the same time new consumers added are taken on at a considerably lower cost than in most companies.

The company has just completed the construction of an 18-in. wrought iron welded gas main, which is a supplementary feeder to supply the North Denver District and is 1,600 ft. in length. The construction of this main was a rather difficult proposition as the yards of the Colorado & Southern Railroad Company, containing some thirty odd tracks had to be crossed. The work was carried on to completion without the semblance of an accident or even a slight interruption, to switching traffic. The result of this work was a bottle tight line which very materially aids in supplying the rapidly growing district.

At the gas plant an elaborate coke conveying system has recently been put in operation. This equipment consists of a number of storage bins, having a capacity of 1,200 tons of coke, conveying belts, screening and separating apparatus. The coke can either be taken from the storage pile or direct from the retort house and conveyed to the screen and bins where the different sized products can be loaded directly into railroad cars or trucks. Ten trucks and two cars may be loaded simultaneously with a minimum amount of cost and effort.

This journal is indebted to George Wehrle, assistant superintendent of the gas department for the foregoing information.

Coal Plant Changes Hands

The New England Coal & Coke Company has purchased the plant and business of the Sprague Breed & Brown Coal Company at Beverly, Mass. The plant covers over three acres of water front.

Gas Plant Improvements at Eau Claire, Wis.

The Wisconsin-Minnesota Light & Power Company are making a number of additions to their plant and installing considerable new machinery, according to information received from A. R. Manley, district manager of the Eau Claire company.

A new 250,000 cu. ft. holder will be installed by the Stacey Manufacturing Company of Cincinnati. Two additional benches of sixes will also be installed, the contract for which has been let to the Parker-Russell Mining & Mfg. Company of St. Louis, who have also contracted to refill one bench.

Considerable addition to the retort house is to be made, the contract for which will be awarded locally.

Two new purifiers, on which the contract has not been decided, are also to be installed.

The improvements in the distribution end include 8,000 ft. of 8-in. cast iron main and 3,000 ft. of 4-in. wrought iron main, and 25,000 ft. of services.

Although further main extensions and improvements were contemplated for the next year, the scarcity of labor and other conditions will limit the company's improvements to the above.

The Wisconsin-Minnesota plant is operated by Kelsey, Brewer & Company of Grand Rapids, Mich.

Main Extension by Lawrence, Mass., Company

The Lawrence Gas Company was granted permission at a recent meeting of the Selectmen at Methuen, Mass., to erect five poles on Hampstead Street and to extend a gas main on Merrimac Street from present terminus to the vicinity of Golf Avenue.

Improvements at Rockingham, Ia., Completed

A $9,000 gas main improvement in the Rockingham district of Davenport, Ia., is practically completed, according to the statement of H. C. Blackwell, general manager of the People's Light Company.

The improvement included the laying of many lateral mains supplying new districts in that portion of the city.

Mains for the city's new steam system are here and the work of taking up the old mains and laying the new ones will begin about June 1.

Improvements at Jamestown, N. D., Begun

The Jamestown Gas Company, Jamestown, N. D., will make extensive improvements to their plant in extending their system to an extent that calls for an expenditure of $10,000. Work was commenced about a week ago.

Bridgeport Company to Lay Track to Fuel Supply

There was no opposition at the recent civic meeting to the request of the Bridgeport (Conn.) Gas Light Company to cross Wordin Avenue with an industrial railroad track. The company desires to use the track to store 40,000 tons of coal across the street from its plant.